

THE IRON AGE

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Play the Ball As It Lies

INDUSTRY is now energetically preparing to put its shoulder to the wheel of Industrial Recovery.

It will not be mere lip service or *pro forma* support that will be given to the President's plan for a reversal of the vicious spiral. The able men of our industry who are now giving unsparingly of their time and energy in consummating the complex details of cooperation are a sufficient guarantee of earnest effort.

The New Deal will get a fair trial so far as the metal-working industry is concerned. Even those of us, and there are quite a large number, who regretted the obvious subserviency of some of our congressmen and senators to the wishes of an organized minority, will "play the ball as it lies" to the best of our ability and with good intent.

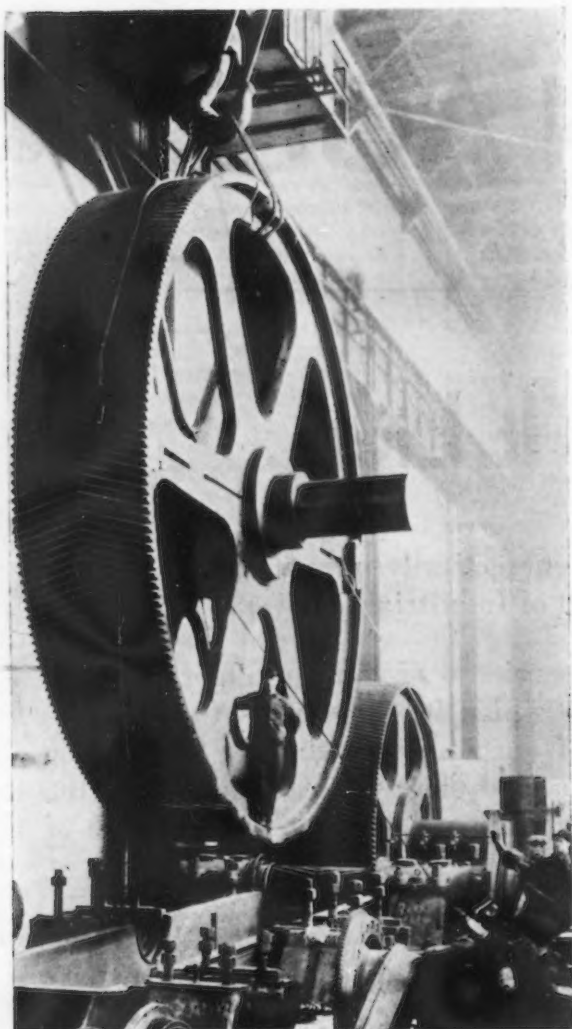
The widespread agreement among employers to the principle of higher wages and shorter hours should be convincing evidence that American capital is prepared for action—not disposed to reaction.

After all, intent is the thing that counts and by which both capital and labor will be judged. If there is a selfish striving for unfair advantage on either side, it will be quickly appraised by the public.

Times of stress and change have heretofore been golden times for the opportunist. What he could not accomplish under normal circumstances and conditions, he was able to "put over" in the confusion of change.

"Smart tactics" and chicanery are no longer in fashion. The New Deal does away with them. We can well afford to part with them if we preserve the normal, progress-stimulating competition that is directed toward general public betterment.





Special reduction gear drive for 96-in. plate mill. Gears are of continuous herringbone type, cut on a Sykes generator. ▲ ▲ ▲

Design and Manufacture of Large Gears For Industrial Service

By THOMAS HOLLOWAY
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& Foundry Co., Pittsburgh

ANY discussion of design and application of large gears involves, to some extent, the subject of gear cutting methods. These two branches of the gear art are closely related because in many cases design has been established from the type of gear available, which, in turn, is dependent upon the machinery for cutting. For example, in the machine tool field prior to 1923, herringbone gears were rarely applied because machinery for cutting small herringbone gears was not very highly developed, but when the continuous tooth herringbone gear became available at closely comparative costs with spur gears, practically every kind of machine tool had some herringbone gears included.

Most large industrial gears are made by methods and on machines that were in use 20 years ago, but there has been considerable improvement in the quality of drives of the medium sizes. By large gears, it is meant gears having over $3\frac{1}{4}$ in. circular pitch, and by medium sizes, pitches between $2\frac{1}{2}$ and 1 diametral pitch, and drives up to about 1000 hp.

In fact, due to this higher standard of gear and gear unit manufacture, the trend of motor design has been rather toward the high-speed geared motor than to the low-speed motor direct connected.

The improvement in this range is due to development of tool making and testing equipment rather than to any marked change in the designs of the machines, with the exception of the continuous development of the pinion cutter generating system. Almost every year from 1922 to 1932 a new machine has been built, each being an improvement over its predecessor, with the result that the latest machine completed in 1932 is capable of generating herringbone gears up to $6\frac{1}{4}$ in. C.P., 60 in. face and 20 ft. diameter with accuracy usually associated with gears of only 1 in. C. P.

Expects Larger Use of Generated Gears

To generate gears of 1 D.P. and over, however, a very expensive set of tool equipment is required so that except for the rather limited number of high speed, high powered applica-

tions, it is more common to template plane or form mill the teeth than to generate them. It is probable that with the gradual accumulation of generating tool equipment and with the further development of the large generators this condition will change and that within a very short time it will be more economical to generate gears than to form them. It is reasonable to assume that, if offered competitively, a much larger volume of generated gears will be used, and that when the users become familiar with the flexibility of the generating system, the ease with which gears are duplicated and their smooth, quiet operation, the formed gears will receive secondary consideration.

The number of installations of large gears of great accuracy is fairly limited; for instance, continuous steel strip mills are now operated at very high speeds, some as high as 1300 ft. per min., and all the stands are high powered. The finishing end of a hot strip mill will take from 3500 to 5000-hp. motors on each stand, and it is quite common for the gears to reach a velocity of more than 3000 ft. per

min., with tooth pressures as high as 2000 lb. per inch of face, neglecting overloads.

It is obvious that for these installations only the highest grade of accurately generated gears should be used and this automatically necessitates machines with large dividing wheels, of very rigid construction, preferably a continuously generating process, and extreme accuracy in cutter manufacture.

The weights of some of these gears are as high as 50 tons, so that great rigidity and massive construction of the gear cutting machine are necessary to preserve perfect control of the gear during the generating process and to avoid errors due to deflection in the machine caused by the weight of the gear.

On the other hand a large blooming mill pinion operating at a low speed but transmitting over 2,000,000 ft.-lb. torque (that is to say, pressures of about 25,000-lb. per inch of face) require teeth having great strength and resistance to shock and are therefore best designed with very large teeth and are generally end milled or template planed.

Horsepower Formula for Large Gears

One difficulty which every designer of large gears encounters is the lack of a horsepower formula which will include all of the various factors involving the life of gears. There are a number of different formulae published which supposedly determine the load-carrying capacity of gears, but all manufacturers of large gears temper these formulae with experience.

It is only safe to say that each formula is a guide and each individual calculation must be tempered with experience and good judgment. There is, for instance, a wide variation in the types and quality of materials used,

DESIGNING and making gears of strikingly large size and weight for modern rolling mill drives are outlined in this article, which is part of the interesting address by Mr. Holloway at the recent meeting of the American Gear Manufacturers Association. Gears of 1 D.P. and over usually have been form milled or template planed, but within the past year, or since suitably large equipment has been made available, the generating method has been employed, especially for cutting large high-speed gears requiring high accuracy. Manufacturing processes illustrated cover gears weighing as much as 138 tons, the teeth of which were cut by a special form milling machine. A horsepower formula employed in designing such gears is also given.



and a wide variation in service conditions. We know that a pair of gears driving a small conveyor may be stressed about four times greater than a pair of gears driving a rolling mill or pebble mill and we know many intermediate conditions. We, therefore, select an average load condition and from experience, select a modifying service factor for each type of service.

A few years ago it would have been necessary to still further modify the average load figure with a factor for mounting and installation, to allow, as far as possible, for various inaccuracies of cutting and inadequate lubrication. It may reasonably be assumed by now, however, that new gears up to $\frac{3}{4}$ pitch when they are installed, are properly mounted, reasonably well cut, and are well lubri-

cated, since these points have been given considerable attention by engineers throughout the industry. We may confine our modifying factors, therefore to: 1—A service factor; 2—a material factor; and 3—a velocity factor. We then have a guide for the determination of horsepower as shown in the accompanying table.

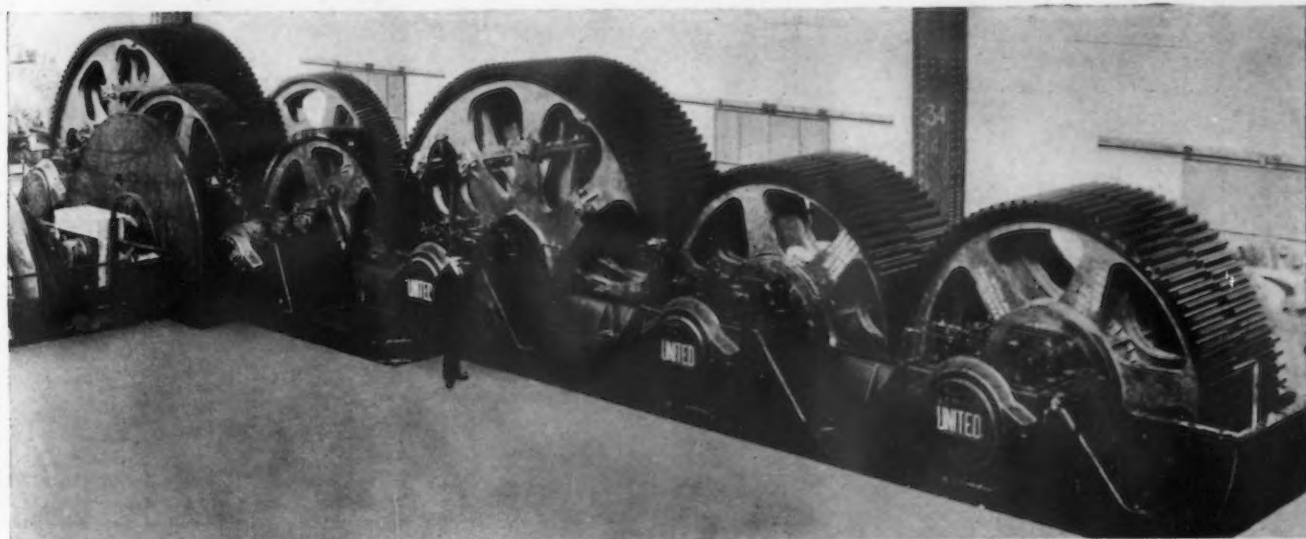
It will be observed from the above that the pitch of the gears is not included. This is due to the fact that, within certain limits, the load capacity is not greatly influenced by pitch, because if gears are designed to resist pitting and wear the factor of safety against breakage is generally over 20.

The foregoing, as stated above, is merely offered as a guide in the selection of size; it is not to be used without good judgment and some experience.

Main Drive Roughing Stands of 96-In. Plate Mill

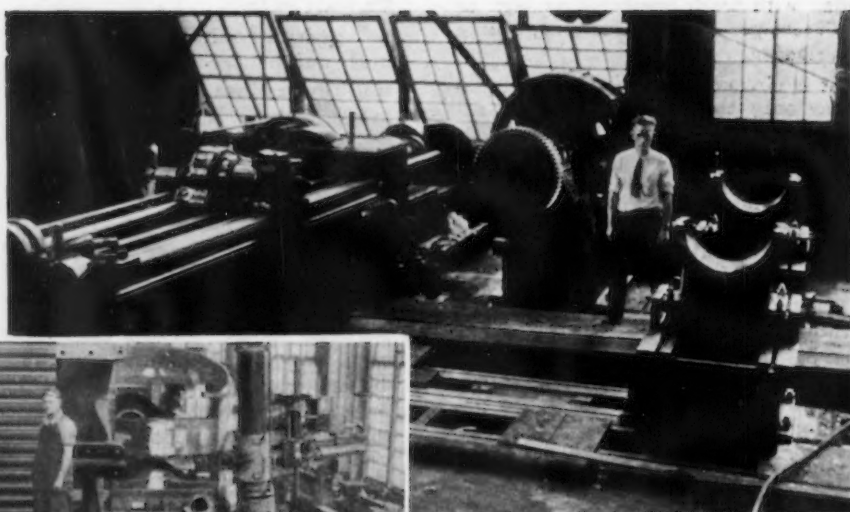
In returning to discussion of the design and methods of cutting large gears, it is obvious that the subject is so broad that a whole volume would be required to cover it properly, and this address is only intended to illustrate the difference between forming and generating methods, which is really the only important point of the subject that is changing and that will affect the trend in design. It is proposed, therefore, to show two typical installations. One is a set of moderate speed gears, of large physical proportion, transmitting 10,000 hp., and the other, a high-speed highly-accurate drive gear for a cold strip mill. Some of the methods employed in the manufacture of the first installation are also here illustrated.

The large special main drive here pictured is for the roughing stands of a 96 in. continuous plate mill. The distance between the stands was established by the rolling schedules and



Special main drive for roughing stands of a 96-in. continuous plate mill. The two largest gears have a pitch diameter of 21 ft. 4 in., 71 in. face width and 128 teeth. The D.P. is $\frac{1}{2}$. They are designed for a tooth load of 580,000 lb. and 485,000 lb. respectively. Pitch line velocities of gears in this train range from 570 to 2540 ft. per min. Timken roller bearings are used on the flywheel shafts.

there was a problem as to whether each stand should be driven by individual motor or whether one motor only could be employed and the connection to other stands be made by gearing. It was decided that, due to the fact that the slab was in only one stand at a time, the single motor would be permissible and that connection to other stands through gears would be more economical than the individual drives. Each stand trans-



GENERAL view of special machine employing end mill method of forming the teeth of large drive gears.



THIS 96-in. plate mill main drive gear weighs 138 tons. It is made up of two rims of four segments each and a center spider. The P.D. is 21 ft. 4 in., the face width 72 in., the number of teeth 268, and the D.P. $\frac{1}{2}$.

mits normally about 10,000 hp. with occasional peaks of 12,000 hp. It is to be noted that the mechanical solution of this problem, while involving a number of gears of very large size, actually effected a saving of about \$90,000 in electrical equipment and a considerable saving in flywheel expense.

Accuracy Closely Checked

At the time that the drive was designed, that is, early in 1929, no gear cutting equipment in the country was

$$\text{H.P.} = \frac{M_t \times F \times D^2 \times N \times S_t \times V_t}{1260}$$

D—Diameter of pin in inches
M_t—Material factor
F—Face of gear in inches
N—R.p.m. of pinion
S_t—Service factor
V_t—Velocity factor

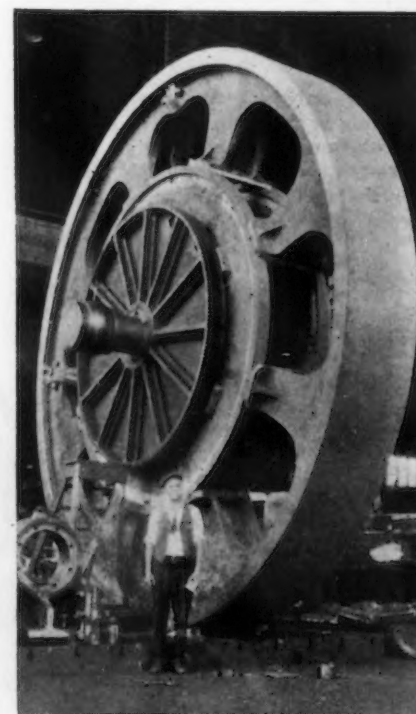
VELOCITY FACTOR

	V _t
Under 100 f.p.m.	1.4
100- 500 f.p.m.	1.2
500-1500 f.p.m.	1.1
1500-2500 f.p.m.	1.0
2500-3500 f.p.m.	0.9
Over 3500 f.p.m.	0.7

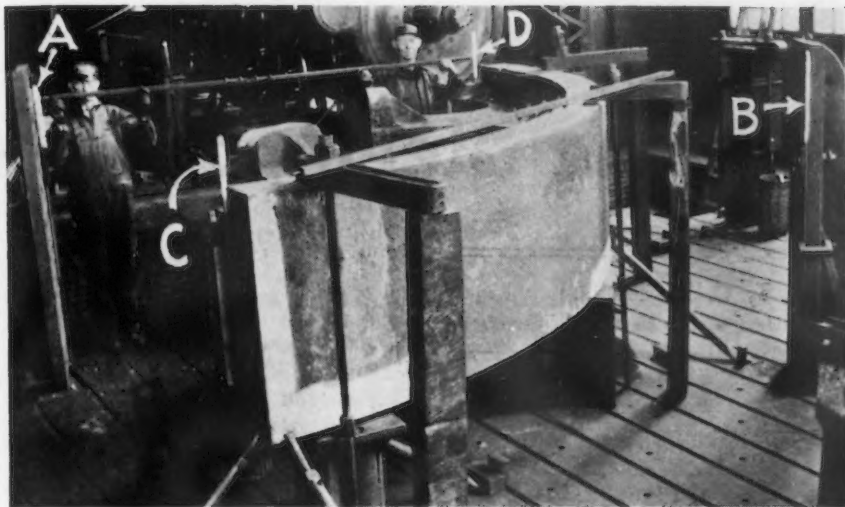
TYPE OF MACHINE DRIVEN

	Service Factor S _t
Hot and cold steel continuous strip mills.	0.45
Ferrous and non-ferrous rolling mills, rubber mills, ball and pebble mills, compressors, heavy fans, cement kilns, suction pumps and cutter heads, speed increasing units.	0.55
Duplex and triplex pumps, steam turbines, power shovels, heavy mixers, hot and cold metal forming mills, paper mills.	0.65
Large hoists, deep well pumps, mixers, agitators, large generators, medium fans.	0.75
Medium hoists, heavy conveyors, light fans, centrifugal pumps, textile machinery, heavy machine tools.	1.00
Light hoists, medium machine tools, bending rolls, medium and light conveyors, grain elevators, cranes.	1.30

PINION	MATERIALS	GEAR
0.4/0.5 per cent or 0.5/0.6 per cent carbon forged steel	0.35 per cent carbon cast steel annealed	1.0
Alloy steel. Pinion hardened to approximate 250 Brinell	0.35 per cent carbon cast steel annealed	1.3
Alloy steel. Pinion hardened to approximate 250 Brinell	0.5/0.6 per cent carbon cast steel annealed	1.5
Alloy steel. Pinion hardened to 500 Brinell	Alloy steel. Gear hardened to 500 Brinell	2.5



GEAR segments assembled with temporary disks, index gear and arbor, ready for mounting in the end milling machine built special for these large gears. The index gear was taken from an old Gleason generator; with this equipment gears were cut to an accuracy of 0.008 in. in tooth division and contour.



EXTREME care is used in machining and measuring the gear segments in order to assure accurate joints and keyways without offsets. Measurements are made from monuments A and B by means of pin gages.

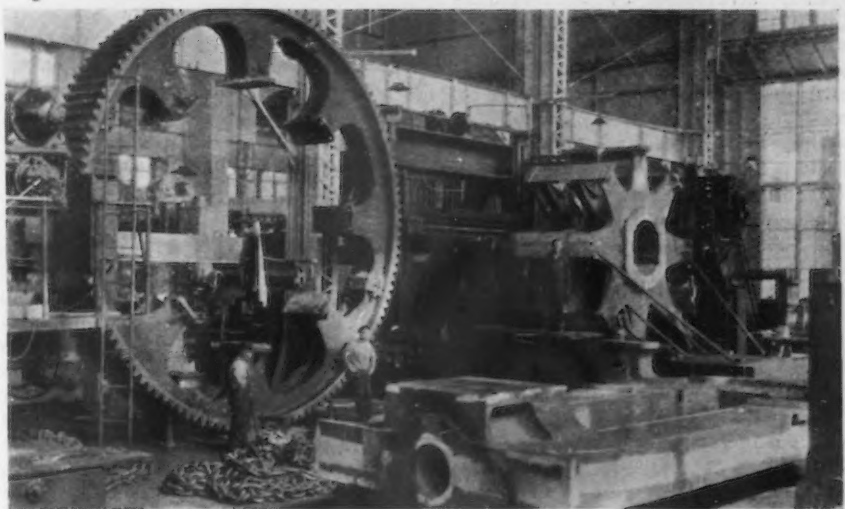
measured the total inaccuracy was 0.008 in. in tooth division and contour.

To secure accurate joints and keyways without offsets it was necessary to use extreme care in machining and measuring the work. Monuments A and B (see illustration of measuring gear segments) were erected accurately in alignment with the machine tool; they consisted of an angle plate with a 1 in. diameter round secured to same in order to facilitate measuring with pin gages in three directions. Monument A represents the center of the gear and the distance A to B is equal to the diagonal measurement

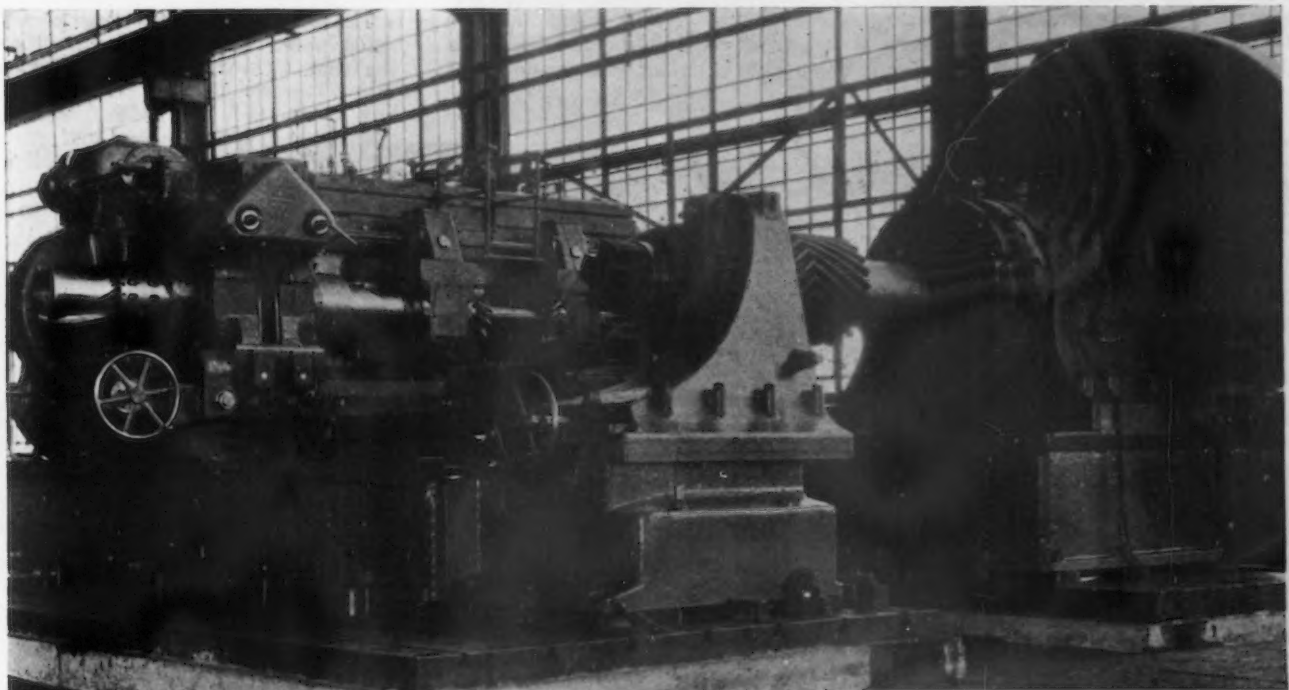
from the inside and bottom of one keyway to the same point at the other end of the segment and shown in the illustration as the distance C to D. They were also located from the cutter the distance equal to the radius of the inside face of the keyway and shown in the illustration as the distance A to D, to complete the sides of the triangle. (Apparent inclination of monument A is photographic distortion caused by position of the camera.)

Point A is the center of all arcs in the segment and is used in setting the segment by distance A to C and in milling the second keyway by distance A to D. Point B is used in the same way as A in that it locates the setting of the segment by distance C to B and

(Concluded on Advertising Page 14)



DRILLING bolt holes to match the gear spider. The work is done on a radial drill. The spider is shown at the right on a 14 ft. planer.



THE finishing ends of hot strip mills employ motors ranging from 3500 to 5000 hp. on each stand, and gears weighing as much as 50 tons. Gear pitch line velocities are over 3000 ft. per min., and tooth pressures are in excess of 2000 lb. per inch of face. Such gears require high accuracy; for cutting them this Sykes generator was installed last year in the Youngstown plant of the United Engineering & Foundry Co.

Welding in the Steel Industry—

By C. M. TAYLOR

Vice-President, Lincoln Electric Co., Cleveland

A GREAT deal of work has been done and a great deal written about the fabrication of structural steel for buildings, bridges and similar structures by arc welding. Little has been written relative to the welded fabrication of structural parts to enable the steel mills to use their own product in the construction of conveyor tables, transfer beds, roll tables, mill shoes and various supports.

Welded design offers an excellent means of cost reduction since there is a substantial saving in weight and a greater possibility of more economical distribution of material. This article outlines some of the results obtained by arc welded construction in various large steel mills.

Several tilting tables have been fabricated by arc welding. Fig. 1 shows a lifting table designed to handle slabs up to 15,000 lb. This motor-driven unit has 21 rollers, rests on an arc-welded pivot base and has a counterweight balance, thus relieving the load on the lifting device. The side frame of the lifting table is shown in Fig. 2. It is made from CB H-beams 345 lb. to the foot. There are two of these sections which form the side

ALTHOUGH comparatively little has been written about the use of welding in building heavy steel mill machinery, much progress has been made in this field of application, as this second article by Mr. Taylor shows. The first article describing the construction of welded steel table and furnace rollers appeared in THE IRON AGE of April 20, page 620.

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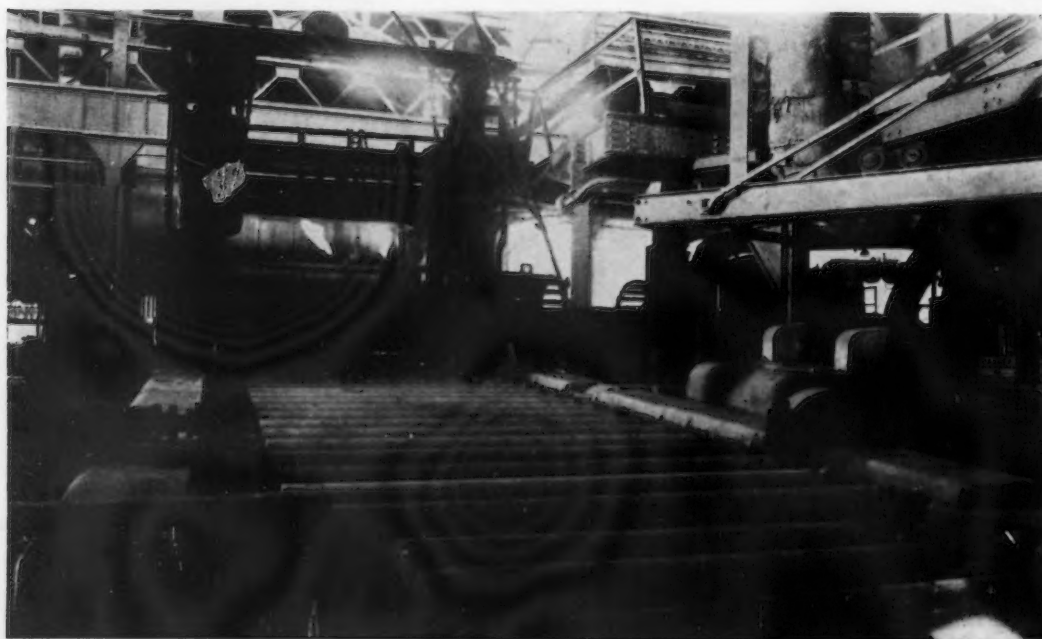
frames of the table. On the left and top edges of the flange a plate is welded the entire length of the H-beam, which is 26 ft. long, with short cross plates for the roller shaft bearings to rest on. These plates and braces serve two purposes: First, to support the bearing and lineshaft; second, to retain the grease for the bearings and gear. The series of braces welded on the bottom of the plates, extending down to the flange of the H-beam, act as a support. Underneath the section where the two flanges of the H-beam are welded a cross plate is welded to give additional

strength. A different view of the side frame is shown in Fig. 3. The weight of the complete structure as shown is 14,000 lb.

The cross beam used to support the side frames of the table is also of welded steel. An extension made up of angles and plates is welded on the top of the beam. It is used to hold the pusher and is so designed that after several passes of the slab through the rolls, when the slab may require turning around, a plunger from the lifting device comes up between the rollers, raises the slab from the rollers, allowing the pusher to turn the slab.

The pivot base, shown in Fig. 4, is made up of H-beams 345 lb. to the foot. The flanges of the six cross beams are cut back the depth of the flange to the web and the end is inserted between the flanges of the two parallel H-beams and welded, forming a complete square. The plates welded on the four corners are machined and used as supports for a bracket arrangement and shaft on which the table pivots.

The base for the lifting device was made up of CB H-beams 345 lb. to the foot. (See Fig. 5.) This view



▲ ▲ ▲
Fig. 1—This motor-driven lifting table has 21 rollers and rests on an arc-welded pivoted base. It is designed to handle slabs weighing up to 15,000 lb.
▼ ▼ ▼

y—Fabrication of Steel Mill Machinery

shows how the flanges of the H-beams were cut out and the end inserted between the flanges of the parallel beams, as explained above.

In Fig. 1 the completed table is shown in its high position ready to receive the slab as it comes from the rolls. There is of course a tilting

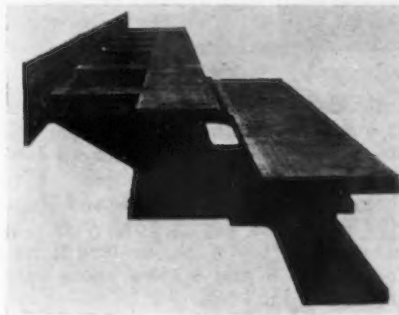


Fig. 2—Side frame of lifting table shown in Fig. 1. It is made from CB H-beams, 345 lb. to the foot.

table on the opposite side of the rolls; this is of similar design, except that it does not have the plunger for lifting the slab or the pusher arrangement.

Small Tilting Table for Bar Mill

A small tilting table for a bar mill was recently constructed in Germany. The assembly of this table, built for a steel mill in Germany, is shown in Fig. 6. The frame is made of heavy I-beams braced by sheet steel and scrap iron. The entire construction was based on the principle of eliminating expensive machine tool work

as far as possible, substituting the cutting torch and the arc welding machine.

The table rests as shown at *A*, and is balanced by lever *B* and counterweight *C* so that the leverage system

acting on *E* will not bear the entire weight of the table. All connections are electrically welded without the use of gusset plates.

Bids received for the supplying and installation of this equipment, includ-



Fig. 3—Another view of the lifting table side frame. The complete structure weighs 14,000 lb.

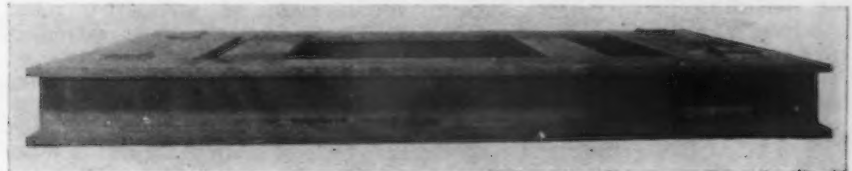


Fig. 4—The pivot base for the lifting table is also made up of heavy H-beams. The flanges of the six cross beams were cut back and the ends inserted between the flanges of the two parallel beams and welded.

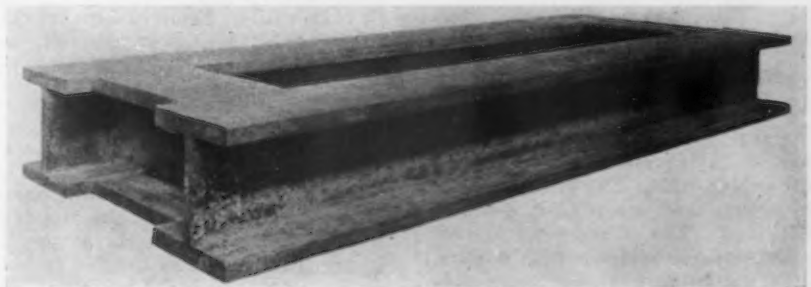


Fig. 5—In constructing the base for the lifting device, the flanges of the H-beams were cut out and the ends inserted between the flanges of the parallel beam.

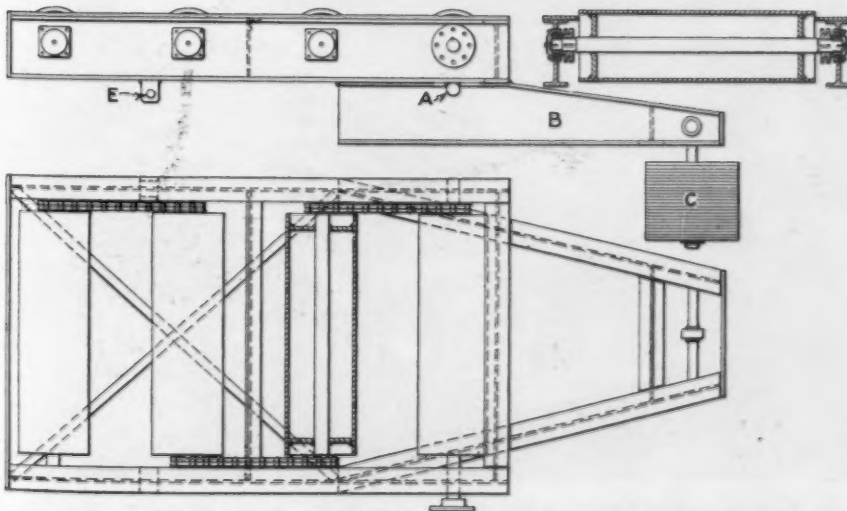


Fig. 6—Details of small welded steel bar mill tilting table built recently in Germany.

ing foundations of ordinary type construction, averaged \$11,900. By redesigning for arc welding and adapting existing equipment where possible, the actual cost was only \$1,025.

An approach to a rotary shear was built for the same mill that installed the tilting table first described. The cross supports of this approach are made of 8-in. ship channels with angles 6 in. x 6 in. x $\frac{3}{4}$ in. welded on the ends. These support the two side frames of the tables and also the cover plates that go between the rolls. The H-beam that forms one side of the table is 57 ft. 6 in. long; it is used as a magnet carrier which travels on small rollers the length of the beam and is controlled and operated by motor cable drive.

The motor for driving the rolls which convey the plates to the shear



Fig. 7—This complete transfer bed, with the exception of chains and motor bases, was fabricated and welded in the field.

sets on an all-electric welded structural steel base. The gear and line-shaft covers are all welded and made oil and grease leakproof.

A welded steel rotary shear back-table has also been built. Welded cover plates that fit between the rolls were provided in this design. These plates rest on the I-beam, and are intended to prevent the possibility of the end of a plate getting under the rollers, which might otherwise occur because of the wide space between each roll on this particular design of table. These table plates can be removed in case of repairs. This section of table has 14 all-welded steel rolls equally spaced.

Transfer Tables Fabricated in the Field

At the left in Fig. 7 can be seen a transfer table consisting of 22 all-steel welded rolls. The framework of the table is made up of 15-in. I-beams 64 ft. long. The cross beams are set on concrete foundations with a separate 12-in. H-beam welded to the side frame of the table. The entire installation of the transfer beds, with the exception of chains and motor bases, was fabricated and electric arc welded in the field.

Fig. 8 shows the framework of the transfer table with cross beams, bearing blocks, lineshaft and brackets. The bolts shown merely hold the beams in alignment while welding. After the tables were lined and leveled up, the bottom flange of the I-beam was welded to the cross H-beam. When this was completed the table frame was turned over and welded from the bottom side of the I-beam, thus making four welds on each end of H-beam to I-beam.

A welded steel kick-off table made up of four 30-ft. sections of 15-in. I-beams, and 15-in. channel H-beams has also been built. The I-beams form the side frames and the H-beams support and tie the frame together. Between each roll is an arc welded lifting arm which serves to remove

the plates from the table and place them in piles.

Fabrication of heavy structural parts such as mill shoes, sub-bases, bearing supports, etc., from rolled steel by arc welding is extremely practical as was demonstrated recently in the rebuilding of a 12-in. merchant mill at the Canton works of the Republic Steel Corp'n. In order to keep costs at a minimum and to make use of their own product, welded steel construction was used wherever possible. The work was planned and carried out under the direction of C. A. Thayer, chief engineer of the Republic corporation; Leonard Larson, chief engineer of Massillon district, and J. D. Donovan, electrical and mechanical superintendent.

Shoe Plates and Sub-Bases of Welded Construction

One of the most interesting phases of the rebuilding was the construction of the various parts at the finishing stand. It was decided to build

both the sub-bases and shoe plates of steel. For this purpose some 84,000 lb. of hot-rolled hot-sheared low-carbon steel bars were used. Five shoes were necessary; for stand 7 and 10, three shoes 16 ft. 6 in., 7 ft. 7½ in. and 18 ft. 3½ in. in length and for stands 8 and 9, two shoes each 18 ft. 3½ in. long.

One of the longer shoes is shown in Fig. 9. It consists of two bottom members 18 in. x 2 in. x 18 ft. 3½ in. two top members 4¼ in. x 10¾ in. x 18 ft. 3½ in., the top and bottom members being joined by a web plate 2 in. x 11 in. x 18 ft. 3½ in., welded in place. They are reinforced by three wing plates on the outside and two on the inside. Four cross members join the longitudinal sections as shown in the accompanying photograph. After welding, the shoes were machined, the top being beveled to a 60-deg. angle, and holes drilled to receive the foundation bolts.

There are approximately 1400 lineal feet of welds on the five shoes, the



Fig. 8—Framework of transfer table showing cross beams, bearing blocks, lineshaft and brackets. Bolts were used to hold the beams in alignment while welding.

total weight being 64,400 lb. The estimated weight of castings was 77,280 lb.

The sub-bases on which the shoe plates rest presented a very simple construction problem. Five of them were made, and the welded steel construction saved approximately 4850 lb. in weight and reduced the cost nearly 50 per cent.

Two bearing pedestals were built quickly with a cutting torch and an arc welder. Guide box supports, guide boxes, bearing brackets and many other parts were also of welded construction. The shielded arc process of welding, using Fleetweld electrodes and welders manufactured by the Lincoln Electric Co., Cleveland, was employed. Three-sixteenth, $\frac{3}{8}$ and $\frac{1}{4}$ in. electrodes were used, the latter principally for the large fillet welds on the mill shoes and sub-bases.

In addition to officials of the Republic Steel Corp., the author is in-

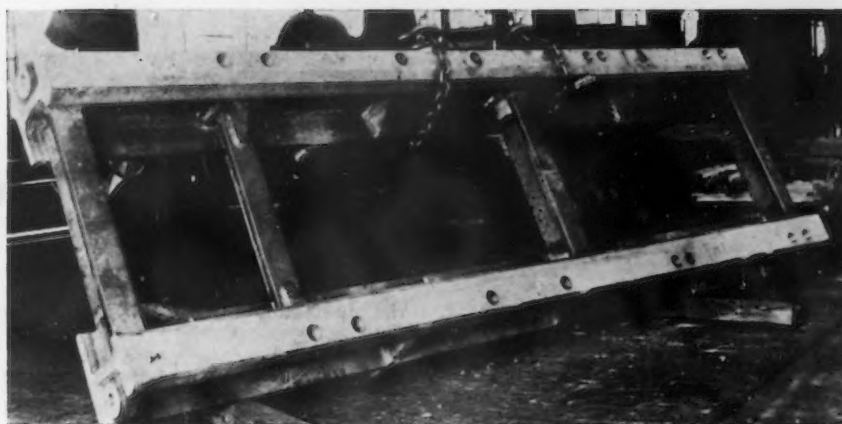


Fig. 9—One of five 18-ft. welded mill shoes. About 1400 lineal feet of welding was required on the five shoes.

debted for much of the data in this article to F. F. Copeland and T. E. Copeland, Carnegie Steel Co., Munhall, Pa., and also K. Jurczyk, Osna-

bruek, Germany, all of whom submitted papers in the second arc welding prize competition recently conducted by the Lincoln Electric Co.

A New Product—Beryllium-Copper Castings

CONSIDERABLE progress has been made in the last year or so in the production of a new product—an alloy of beryllium with copper. A report on this development was made in a paper by Edwin F. Cone, New York, entitled, "Beryllium-Copper Castings—Foundry Practice, Heat Treatment, Properties," presented at a session of the non-ferrous division of the American Foundrymen's Association at its annual convention in Chicago, June 20 to 23.

For some time there has been a keen interest in the rather rare metal, beryllium. Some research, particularly in Germany, has been conducted on its recovery, its properties and its effect as an alloy with steel, iron and non-ferrous metals. The major part of the investigations has covered the effect of beryllium as an alloy with copper, with the emphasis in this country on the wrought or rolled products. Recently the research has broadened into the foundry phase of the subject.

A "Master Alloy" Furnished

The whole subject has, however, been handicapped by the high cost of the metal. But in the last year costs have been lowered decidedly by the Beryllium Products Corp., of New York, which has a reducing plant at Marysville, Mich. There is now available a combination of beryllium and copper, designated as a "master alloy," containing about 12.5 per cent Be. This is sold as a base or raw material for introducing beryllium into beryllium-copper products, the

aim being to secure a final range of 1.50 to 2.50 per cent Be. For wrought products about 2.25 per cent Be is regarded as standard with 2.50 per cent for the cast material.

In the foundry field, most of the commercial work thus far has been done by the American Manganese Bronze Co., Holmesburg, Philadelphia. The author, who visited this foundry, reports that, in general, foundry practice for the beryllium-copper castings closely resembles that for phosphor-bronze castings. Details of the precautions necessary in melting and introducing the beryllium are given in the paper, temperature control within narrow limits being necessary. Close regulation of pouring temperatures is also essential. Heads and gates are necessary to insure even flow of metal in the mold and a solid product. Melting loss is low and a feature is the high value of the scrap because of the possible high recovery of beryllium.

Precipitation Hardening a Feature

One of the most interesting features of beryllium-copper alloys is the results obtainable from their proper heat treatment. These alloys are capable of precipitation hardening, which greatly enhances their properties. They resemble the aluminum and magnesium alloys, partly because beryllium is a light metal, one-third lighter than aluminum and only one-sixteenth heavier than magnesium. The paper gives the details of the heat-treating cycles. In general the alloy, as cast, is annealed and

quenched in water, which results in the solid solution of the beryllium. Precipitation hardening then follows at various temperatures, and at stipulated heating periods followed by normalizing, which greatly enhances the properties. Tensile strengths up to over 117,000 lb. per sq. in. are obtainable with Brinell hardnesses up to over 400. In the rolled products, tensile values up to 196,000 lb. per sq. in. are cited.

Besides high physical values and hardness, heat treatment bestows unusual electrical conductivity, wear resistance and thermal conductivity, which are discussed in the paper.

Some Industrial Applications

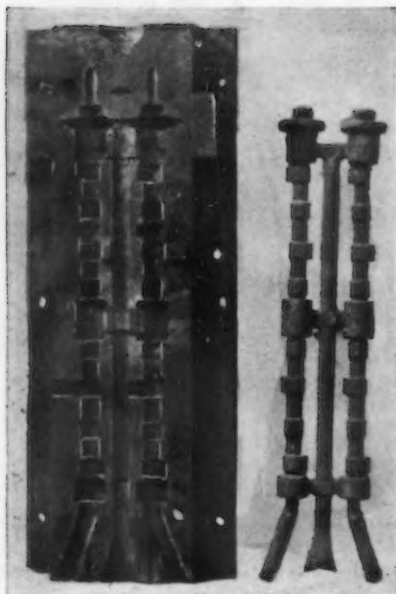
The concluding section of the paper has to do with applications of beryllium-copper castings. These have not yet been extensively explored but those already demonstrated are interesting. Because of the many possible properties which can be developed by judicious heat treatment, many other uses will come to light as the industry develops. Some of the uses cited by the author are as follows.

In the aviation field, an extremely interesting application is a bearing sleeve of 2.50 per cent beryllium-copper castings, of which several hundred have been made. They are an essential factor in a new adjustable pitch propeller, now being introduced, which promises to radically change flying methods and hazards, and to increase speed. It has been found in this case that the precipitation-hardened castings can be easily machined after this treatment, eliminating the necessity of doing this before hardening.

Another application is beryllium-copper propellers for racing boats.

(Concluded on Advertising Page 14)

Die Casting Iron and S



Camshafts are being successfully die cast in vertical molds which are bottom poured.

SINCE the first of this year an automatic die-casting machine has been put into practical operation in the production of cast-iron camshafts and this brings the whole subject of die casting of iron and steel into prominence. The so-called permanent molds in the iron foundry industry already have achieved some success and high production semi-automatic operations on casting machines of the Holley type, such as used by the De Laval Separator Co. and described in *THE IRON AGE* of June 15, are now established practice in several plants.

In this article the distinction between die casting and permanent mold casting essentially is one of pressure. Die-casting machines use permanent molds, but in addition the molten iron is forced into these molds under pressure just as in the long-established practice of die casting of the softer metals such as the zinc alloys.

The introduction of a permanent mold machine into the average foundry probably will meet with as much resistance as did the introduction of the molding machine. However, it seems destined to occupy a prominent place eventually. Great strides are being made in the technique of sand molding, and elaborate equipment has been devised to reduce to a minimum the number of operations and the efforts of the sand molders. Stripping plates, vibrators, jolt roll-over machines, and ingenious material-handling devices are some of the principal features. In highly mechanized sand casting foundries empty flasks reach the molder on a roller conveyor from one side, are filled, tamped and stripped by machine, and when complete leave on the same conveyor from the other side whence they pass to

the start of a continuous pouring operation.

Some Disadvantages of Sand Casting

Production by some such method is often large and efficient, but even at its best, sand casting technique has many disadvantages. Extensive floor space is required for molds, molding machines, sand storage, sand handling equipment, and sand reconditioning machines. The cost of handling sand must always be an appreciable item because of the large volume involved. These disadvantages may be grouped under the heading of cost. Other disadvantages may be listed under the heading of quality. The late Dr. Richard Moldenke, one of the greatest authorities on sand molding, said shortly before his death that one of his strongest desires was "to know how to finish a sand mold so it would peel perfectly."

In one of his many tests he made up 42 sand molds with the best possible coatings and after the castings had been made he examined their surfaces under a high powered glass and in all cases was able to see "patches of sand" adhering to the castings. Such sand inclusions are avoided by the permanent mold. The actual grain structure of castings apparently is improved in iron molds as

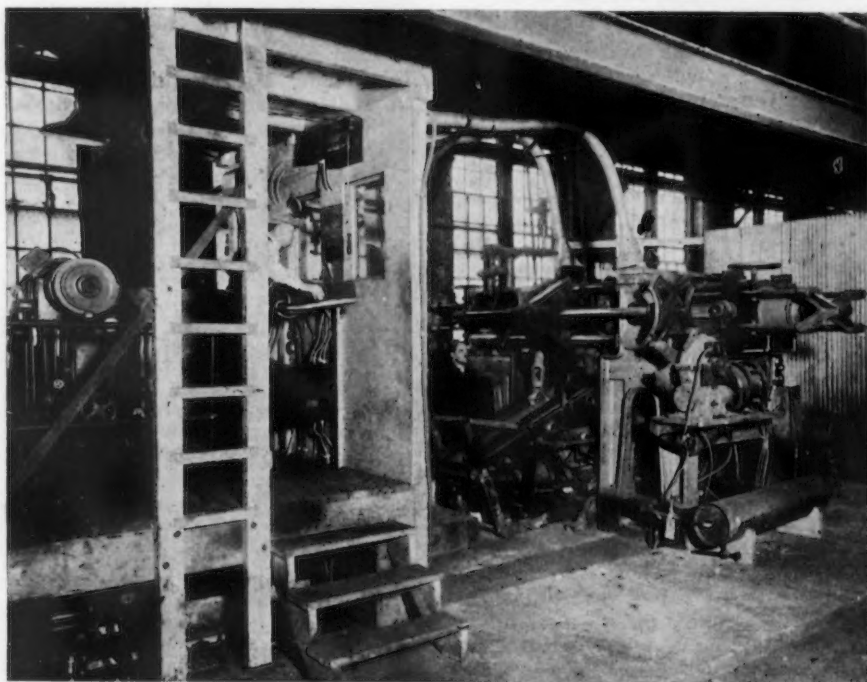
against sand molds, and when pressure is added, as in die casting, further improvements are apparent.

At present engineers in many fields are cooperating as never before in the study of foundry technique. Never before have they had such an array of alloys to draw upon and such precision methods of melting and casting. The result has been the development of practical die casting technique for iron and steel and the production of superior quality castings.

Technique of Die Casting

Die casting of iron differs as much from the usual method of permanent mold casting as the latter differs from sand casting. Die casting of low melting point alloys, although a comparatively recent process, has been in practical operation in this country for nearly 40 years, but it is a big step between the die casting of alloys melting under 1000 deg. F. and those melting at from 2500 to 3000 deg. F. It was necessary to deviate sharply from the usual non-ferrous die casting practice, and a description of the design and operation of a large die-casting machine now producing iron camshafts may serve to indicate some of the chief items of departure.

This machine, known as a "Castomatic," was designed by A. W. Mor-



This machine in actual production of cast iron camshafts is remote controlled from the switch-board shown in the left foreground. The overhead pipes carry air under pressure for cooling.

By A. W. MORRIS and HERBERT R. SIMONDS

ris and is now in commercial operation at a large Pennsylvania manufacturing plant. It was built at a cost of about \$25,000. With its "controller" and reservoir ladle it weighs 60,000 lb. and is about 18 ft. long, 8 ft. wide, and 8 ft. high. Castings weighing from 50 to 250 lb. and up to 8 ft. long have been successfully produced on it and the normal capacity is 5 tons of simple castings an hour. Some idea of the size and ruggedness of the casting machine may be had from the fact that for large intricate castings the molds frequently weigh from 5000 to 6000 lb.

Operations Controlled by Camshaft

A "controller unit," which may be located at any convenient distance, controls all operations. Briefly, this "controller" is a motor-driven, cam-operated, multiple-valve device having 18 simple and easily adjustable cams which hydraulically regulate all operations with close accuracy. The actual movement of parts is secured by electric motors and hydraulic cylinders. Metal from a sealed container is forced up (thus "bottom pouring") into the mold at a varying rate of flow, starting slowly and winding up fast, thus intensifying the pressure as the mold is nearly filled, and driving the metal into all corners of the mold. For emergency, and for "setting up" the machine, any or all of these operations may be switched to direct manual operation, or omitted altogether.

Provided molten iron of the proper analysis and temperature is delivered so that there is always a supply in the reservoir, and the annealing oven temperature maintained correctly, the process is automatic. With the controller motor running, the operator merely pushes a button and the sequence starts. Sand cores, if they are necessary, are picked up and located in the mold, metal cores are pushed in place, ejector pins are withdrawn to pouring positions, and the two or more parts of the mold are closed. Coincident with these operations, metal from the reservoir fills the pressure chamber to a predetermined level, maintained by means of an automatic scale on which the pressure chamber rests when in free position, and the spout through which the metal is poured is automatically withdrawn.

After all these things have been accomplished the pressure chamber is elevated and clamped tightly against

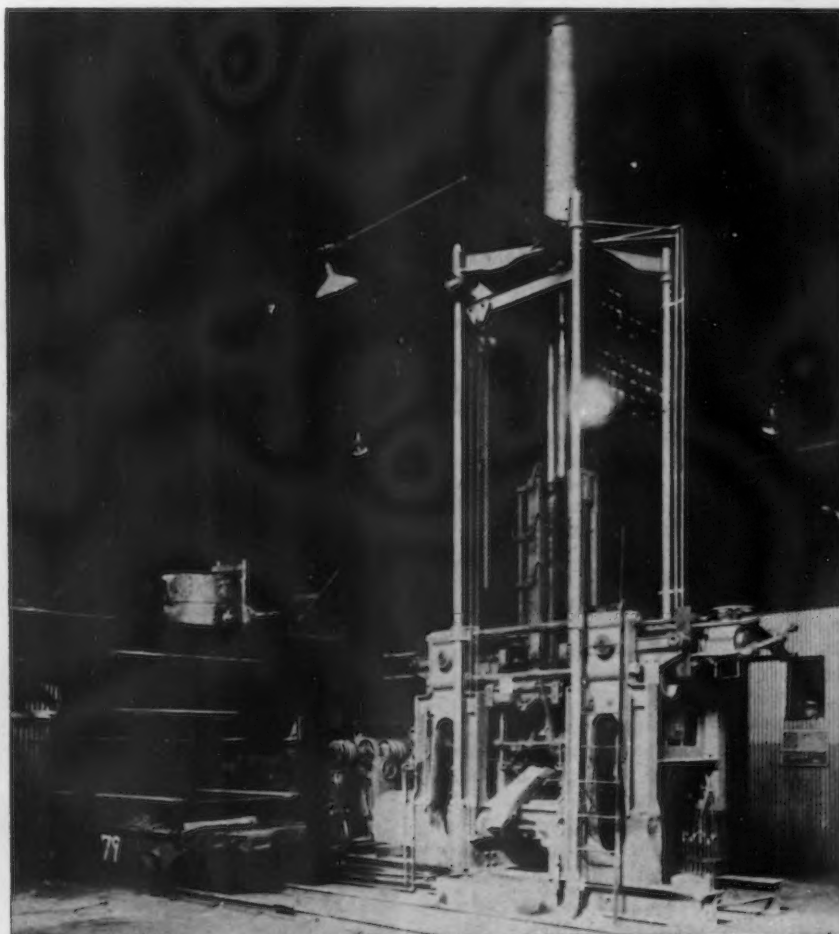
CAST-IRON camshafts for use in a well-known automobile are now being successfully produced on an automatic die-casting machine. This article describes some of the operating details in this connection, as well as some of the results of recent research work in the field of die casting of iron and steel. Production of cast-iron crankshafts and of gray iron valve stem castings in machines designed by Mr. Morris was briefly dealt with in *The Iron Age* of April 27, page 665.

the bottom of the mold. In this position the opening through which the pressure chamber was filled is closed;

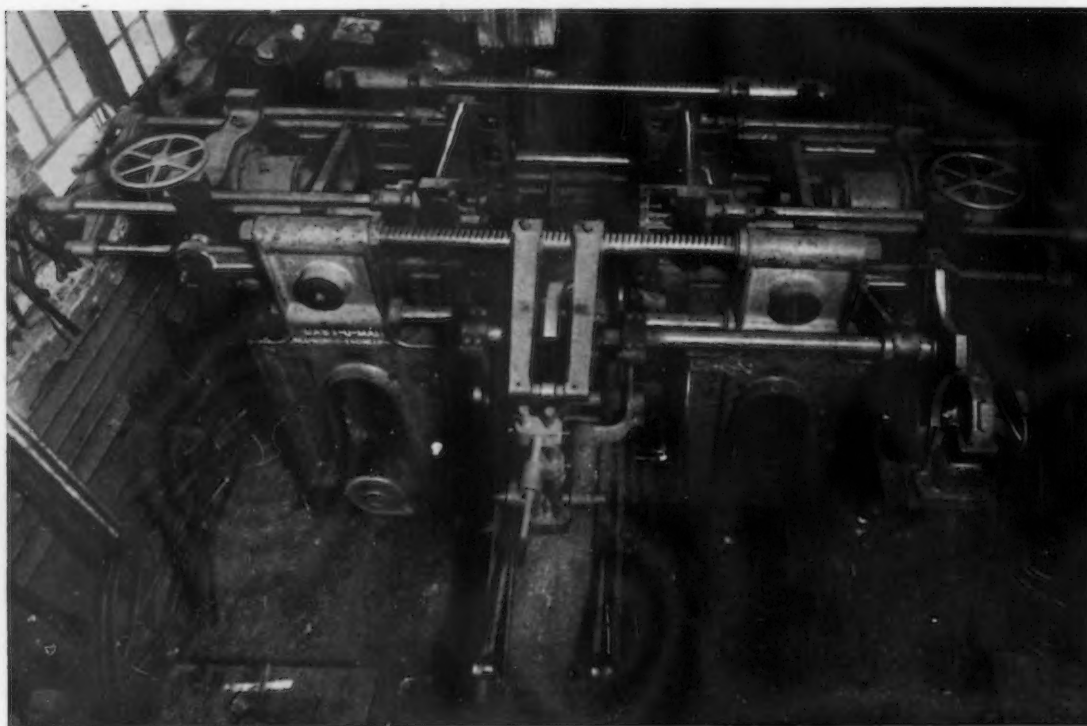
the plate which closes it has a valve-controlled opening for the introduction of a reducing gas under pressure. This gas is used to force the molten iron up a "nozzle" or gate and into the mold. The pressure varies from 25 lb. to 250 lb. per sq. in., depending upon the design of the casting. The molds are designed with vertical parting, thus providing ample vents ahead of the rising metal.

The bottom pouring holds together the incoming metal, prevents entrapping of air, and greatly reduces oxidation. The point of entrance of metal at the bottom of the mold is cooled by circulating water so as to "trap" the metal at that point as soon as the casting has set under the continuing pressure which feeds the shrinkage.

Soon after the casting has set, reverse operations start. The metal cores are withdrawn, the mold is



Die-casting machine in production on cast iron pipe. A metal core is used and is withdrawn by the pneumatic cylinder shown at the top of the machine. It is necessary to pull the core out of the hot metal at just the right moment after it has started to freeze and before it shrinks.



▲ ▲ ▲
Top view of the die-casting machine now in production of camshafts. The mold has been removed to show the mold-holding jigs and the operating mechanism.
▼ ▼ ▼

opened, the casting remover arm is inserted and the ejectors come into action. All this happens within a few seconds. The hot casting is swung around by the remover arm and placed in position in the annealing oven, the doors of which open and close automatically in proper synchronism. Immediately after ejection of the casting and while the mold is wide open, preparation is started for the next casting. The mold is cleaned by strong air pressure and coated with an inert soot. It is then cooled and inspected (by a system of lights and mirrors) and the whole sequence starts over again.

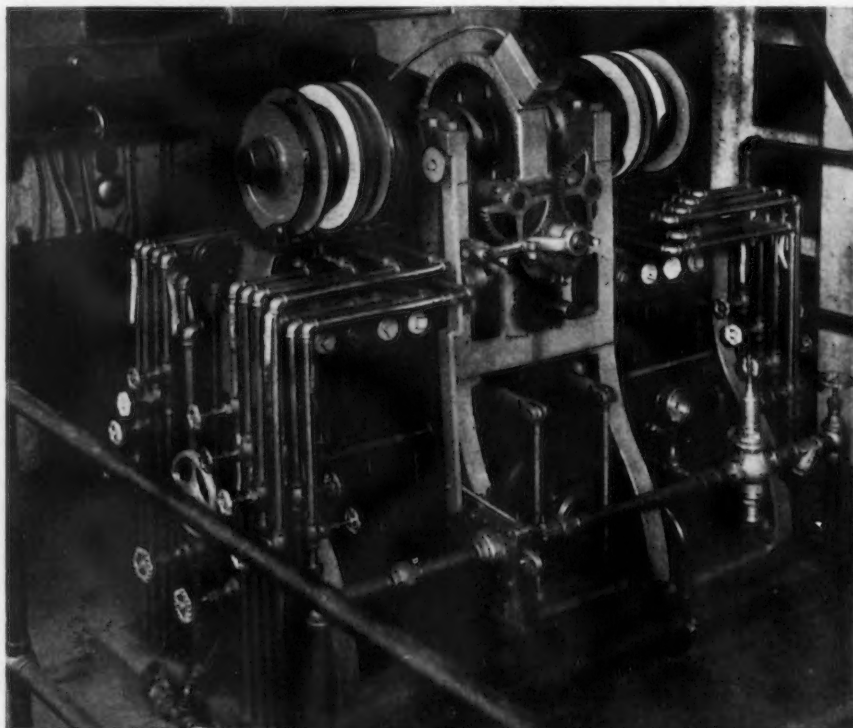
Types of Iron Used

Not all irons are suitable for die casting even under most favorable conditions. In general, the experience of those who have operated die-casting machines indicates a decided preference for electrically melted iron. Much has been written on the effect of the electric furnace on grain structure and so that subject will not be dwelt on here. Occasionally experience shows that the analysis must be changed with a variation in type of castings. However, this is not a serious difficulty as castings may be easily grouped according to the iron requirements. Many of the same principles used in sand casting apply to die casting. As in sand casting the temperature at which the metal enters the mold proper should be consistently low, but in die casting the metal should be hot up to the point of entering.

Nitridable cast irons are being successfully die cast, but with a higher percentage of rejections. The stainless steels have been handled easily in

die casting operations in laboratory research work, and at least one company contemplates commercial production in this field. Experience indicates that many of the alloys give less trouble than the plain steels, but it is too early to make any generalization. Table I gives ten different cast irons which have been successfully die cast and which, as a group, will meet almost any condition which the foundryman will encounter.

The quality of die castings shows the same advantage over sand castings as does any permanent mold productions. These advantages were outlined in an article on permanent molds in *THE IRON AGE* of June 15, page 940. Because of the pressure used in die casting, some further advantages are evident. Surfaces are said to be smoother, less tumbling is required, and plating and galvanizing
(Concluded on Advertising Page 14)



Close-up view of the control mechanism used in either automatic or manual production of iron die castings. A central camshaft is used to regulate valves which in turn operate the various parts and processes of the casting machine.

Current Trends and Expectations in The Metal-Working Industry

A Survey by The Iron Age

EVERYBODY may easily know just what the steel-producing industry is doing from week to week as to volume of business, because the production rate is reported each Thursday by THE IRON AGE for the current week.

This is true also of automotive production and orders, which are reported with regularity and considerable accuracy in our columns.

But there are no similar systematic statistics to report the business volumes of the users and fabricators of metals; the varied industries which transform metals into machinery and consumer products.

THE IRON AGE, in the following original survey, gives a detailed cross-section of actual trends and expectations in this important branch of the industry.

If the buying of steel and other metals were of a speculative nature, as some suppose, we would find this fabricating branch

of the industry lagging behind the production of steel and other materials.

But, on the contrary, we find, as the result of this survey, that producers of fabricated metal products have apparently kept pace, in gains, or have even exceeded, the gains of the producing industry.

Of course, this survey cannot be accepted as representing the entire field of metal fabrication. But it is, we believe, a large and fair cross-section.

The charts which are shown represent the trend of volume in orders or shipments from month to month of this year. They do not represent actual volumes, but do represent the percentage increase in volumes, or vice-versa.

The overwhelming unanimity of gains, in this branch of the industry, in its diversified representation, should certainly indicate, in our opinion, that American industry is well started on the road to recovery.

Definite Trend Toward Rehabilitation

I AM happy to be in a position to say that our steadily increasing volume of business is reflecting a heartening improvement.

While there still remains much to be accomplished in the way of bolstering prices before we can enjoy any material measure of profitable prosperity, I feel confident that the various trade associations, operating within the several branches of industry, will correct some of the difficulties that have so seriously attacked the price structure.

As for the outlook of the future, we confidently expect that the increased public works activity will strengthen the merchandising potentialities of our contractors equipment.

The improvement in renewal parts business reflects a definite trend toward the rehabilitation of industrial production equipment.

W. Harnischfeger, President,
Harnischfeger Corp.,
Milwaukee.

Whole Trend Has Changed

WE have shown better production operations and increased volume of business progressively each month since December.

The whole industrial trend has changed. For example, the new beer business runs not so much to barrels as in the old saloon days. Breweries are being remodeled and new warehouses have been in demand. We have been building additions not only to breweries but to glass fac-



OLIVER MACHINERY CO.
Grand Rapids, Mich.
Wood Working Machinery
April, 44 per cent over March
May, 214 per cent over April
June will be about 80 per cent over May.



ERIE FOUNDRY CO.
Erie, Pa.
Forge Shop Equipment
April, 40 per cent over March
May, 300 per cent over April
June will be 100 per cent over May.



WROUGHT WASHER MFG. CO.
Milwaukee
Washers and Stampings
April, 16 per cent over March.
May, 41 per cent over April.
June, first half, 78 per cent over May first half.



ALLIANCE MACHINE CO.
Alliance, Ohio
Cranes and Steel Mill Machinery
April, 56 per cent over March.
May, 265 per cent over April.



STRONG STEEL FOUNDRY CO.
Buffalo
Steel Castings
May, 82 per cent over April.
June, first half, 50 per cent over May.



HALL MFG. CO.
Toledo, Ohio
Cylindrical Hones & Automotive Tools
April, 15 per cent over March.
May, 10 per cent over April.
June, slightly under May.



HAYS CORPN.
Michigan City, Ind.
Gages and Flue Gas Analyzers
April, 9.4 per cent over March.
May, 16.8 per cent over April.



CHICAGO HARDWARE FOUNDRY CO.
North Chicago
Hardware Castings
April, 25 per cent over March.
May, 25 per cent over April.
June will be 25 per cent over May.



OHIO BRASS CO.
Mansfield, Ohio
Car Equipment, Insulators, Valves, etc.
April, 17½ per cent over March.
May, 47 per cent over April.
May, 1933, 32 per cent over May, 1932.



CUSHMAN CHUCK CO.
Hartford, Conn.
Chucks
April, 65 per cent over March.
May, 20 per cent over April.
June running slightly ahead of May.



CRUCIBLE STEEL CASTING CO.
Cleveland
Steel Castings
February, 22 per cent over January.
March, 0.6 per cent over February.
April, 13 per cent over March.
May, 141 per cent over April.
June will exceed May.



SQUARE D CO.
Detroit
Electrical Equipment
April, 19 per cent over March.
May, 50 per cent over April.



STOVER MFG. & ENGINE CO.
Freeport, Ill.
Engines and Farm Equipment
April, 14 per cent over March.
May, 18½ per cent over April.

tories and other establishments connected with the packaging trade.

Many other factors help to account for the heavier output. So far as the building industry in general is concerned, there is no occasion for pessimism at all. Gloom is being rapidly dispelled and in going around a number of cities lately, including New York and Chicago, I find there is a very much better feeling. In fact, there seems to be a definite confidence that the upturn actually has come.

We find that the market for raw materials has been stiffening, with prices going up.

H. H. Robertson, President,
H. H. Robertson Co.,
Pittsburgh.

...

Crane and Shovels Are Being Put to Work

WE have as yet found no distinct improvement in the way of new crane and shovel sales, but our repair account, both last month and so far this month, indicates that more machines are being put to work than heretofore. This in turn would indicate that as fast as the idle machines are absorbed, new ones will be ordered, so we are very hopeful of the future.

William H. Waite, Sales Manager,
Browning Crane & Shovel Co.,
Cleveland.

...

Outlook for Business Now More Promising

OUR May business was ahead of April and April better than March.

We would further advise that the outlook for business is more promising than for the past several months.

W. B. Huther, President,
Huther Brothers Saw Mfg. Co., Inc.,
Rochester, N. Y.

...

A Definite Improvement Is Taking Place

WE can say, with certainty of being truthful, that indications are that a definite, not a spasmodic, improvement has taken place. Our own specialties will begin a seasonal upturn in July, and we are expecting a better season than that of 1932, which was the lowest we have ever experienced. Inquiry is more active and indicates better sales during the last half of the year.

Henry E. Schwab, President,
R. J. Schwab Sons Co.,
Milwaukee

...

Pleasing Pick-up in Printing Machinery

APPARENTLY the fear of inflation is passing out of the minds of the printing industry and we are receiving a decided increase in business in June over that of both April and May, and, if business does continue as it has so far this month, June will show a very pleasing number of orders and will compare with March of this year, the best month of orders in nearly two years.

C. A. Thomas, President,
F. Wesel Mfg. Co.,
Scranton, Pa.

...

"Barometer" Lines Indicating Better Business Weather

VIEWED from our activities, and we serve the majority of industries, I feel that general business is definitely on the upturn, although it will probably be irregular. The orders we are receiving are generally small, but the quantity of inquiries and orders is larger now than at any time for the past two years. Many of our accounts which have been more or less dormant are now becoming active on our barometer lines. As production is

stepped up, industry will not permit tie-ups caused by hand to mouth buying of tools, with no stocks on hand, and this condition should be reflected by a considerable increase in volume in the tool industry.

N. A. Woodworth, President,
Ex-Cell-O Aircraft & Tool Corp.,
Detroit.

• • •

Believes Improvement Is General

IT is our opinion, and we come in contact with a good many individuals who represent various lines not only in this State but in other States and they are all of the same opinion, that business has been increasing gradually for the past two months.

And, according to all indications, will continue to improve. Financial difficulties are gradually improving.

George J. Hewlett,
Cleveland Union Engineering Co.,
Cleveland.

• • •

Toledo Scale Reports Improvement

SALES during May exceeded those of May, 1932, by 20 per cent. Industrial sales during this period were 43 per cent above the same period last year, which indicates that industrial activity is definitely increasing. In addition, May showed a 60 per cent increase over April, which had been the best month since Nov., 1932.

Toledo Scale Co.,
Toledo, Ohio.

• • •

On the Road to Better Business

I BELIEVE business is now on the upgrade. We may have to slip back a step or two every once in a while, but I fully believe that we are on the highroad to better business conditions.

The reason I believe this to be true is because there undoubtedly is a big increase in the confidence of the people. They no longer believe that this country is on the highroad to destruction.

George S. Whyte, President,
Macwhyte Co.,
Kenosha, Wis.

• • •

Postponed Business Is Now Resuming

MANY propositions which have been held up for several years are coming back to life, in every case it is improvement. Some of these inquiries are becoming active, very active, at the present time.

W. H. Purcell, President and General Manager,
Alliance Machine Co.,
Alliance, Ohio.

• • •

Optimism Apparent

THERE is an apparent optimism throughout the country which promotes a buying attitude and we have every confidence that our business will continue showing improvement.

Shirl M. Rudolph, Sales Manager,
Hays Corp.,
Michigan City, Ind.

• • •

Looks for Continued Gradual Improvement

NATURALLY, we feel very much encouraged over the outlook, the improvement of which we attribute partially to the fact that it would be difficult to conceive of conditions going very much worse than they were at the beginning of the year, and any change would seem



OHIO NUT & BOLT CO.
Berea, Ohio
Nuts and Bolts

April, 70 per cent over March.
May, 40 per cent over April.
June will exceed May.



FROST CO.
Kenosha, Wis.
Plumbers' Brass Goods, Etc.

April, 90 per cent over March.
May, 50 per cent over April.
June will exceed May.



BONNEY FORGE & TOOL WORKS
Allentown, Pa.
Drop Forgings, Wrenches, Etc.

April, 37 per cent over March.
May, 25 per cent over April.



OHIO ELECTRIC MFG. CO.
Cleveland
Electrical Apparatus

April, 224 per cent over March.
May, 55 per cent over April.
June will well exceed May.



BOWEN PRODUCTS CORPN.
Auburn, N. Y.
Lubricating Devices, Etc.

April, 93 per cent over March.
May, 31 per cent over April.
June will exceed May.



STREINE TOOL & MFG. CO.
New Bremen, Ohio
Tools

April, 30 per cent of normal capacity.
May, 50 per cent of capacity.



OTTAWA SILICA CO.
Ottawa, Ill.
Silica Sands

April, 38 per cent over March.
May, 51 per cent over April.



EX-CELL-O AIRCRAFT & TOOL CORPN.
Detroit
Machine Tools

April, 27 per cent below March.
May, 46 per cent over April.
June will be best month this year.



SULLIVAN MACHINERY CO.
Chicago
Mining Machinery

April, 40 per cent over March.
May, 27 per cent over April.



MOTOR WHEEL CORPN.
Lansing, Mich.
Motor Wheels

May, 20 per cent over April and best month since Sept. 1929.
June will exceed May by 20 per cent.



CRANE CO.
Chicago
Valves, fittings, etc.

April, 12 per cent over March.
May, 23 per cent over April.



FEDERAL MACHINE & WELDER CO.
Warren, Ohio
Electric Welding Equipment
March, 20 per cent over February.
April, 13 per cent over March.
May, 50 per cent of old normal.
June will be 60 per cent of normal



Turbine Blowers & Exhausters
April, 3 per cent over March.
May, 47 per cent over April.



OSTER-WILLIAMS
Cleveland
Threading Equipment
April, 35 per cent over March.
May, 10 per cent over April
June will be 15 per cent over May.



AMERICAN HOIST & DERRICK CO.
St. Paul, Minn.
Hoists and Derricks
April, 70 per cent under March.
May, 64 per cent over April.
June will be 200 per cent over May.

of a necessity to be for the better; also, partially, to the Administration policies, which could not fail to create more of a feeling of confidence. The Administration policies, of course, are still to be tried out, and while we have nothing but commendation for the attitude of the President thus far, it remains to be seen how much support will be given to him and what his further attitude will be in case adequate support is not given to the policies as set forth by him thus far.

On the whole, however, we believe that we are definitely on the upgrade, and while complete recovery will undoubtedly be slow, we think it will continue with possibly slight recessions from time to time until real prosperity can be said to have returned.

W. J. Frost, President,
Frost Co.,
Kenosha, Wis.

Notes Better Sentiment

WE note a great improvement in the sentiment in the plants that we contact, but there is still some hesitancy in making commitments for machinery, but we are hopeful for the future.

H. H. Leonard,
Consolidated Packaging Machinery Corp.,
Buffalo.

Price Situation Improving

OUR month of May was an increase of 100 per cent over April, and the present indications are for a continuance of improved business.

We feel that the greater production requirements have



LANSTON MONOTYPE CO.
Philadelphia
Type-Setting and Casting Machinery
April, 5 per cent over March.
May, 21 per cent over April.
June, well over May.



HOMESTEAD VALVE MFG. CO.
Coraopolis, Pa.
Valves
March, 15 per cent of normal.
April, 30 per cent of normal.
May, 40 per cent of normal.



BEALS, McCARTHY & ROGERS
Buffalo
Steel, Hardware, Metals
March, 13 per cent over February
April, 19 per cent over March.
May, 24 per cent over April.
June will exceed May.



Electric Appliances
May, 35 per cent over April.
June, 50 per cent over May.

made it necessary for customers to purchase quality merchandise again, which has tended to eliminate a good deal of the low priced, low quality competition.

We feel sure that the needs of the country will provide a greater volume of business than we have enjoyed since 1930.

D. G. Anderson, President,
Morrison Machine Products, Inc.,
Elmira, N. Y.

Real Test Will Be Increase in Wage Buying Power

THINGS are certainly moving forward again to a degree which perhaps has not been equaled since the depression began. The question is, will they continue, and in regard to this, I suppose that one man's guess is almost as good as another. The inflationary processes which have already raised commodity and security values are making people feel very definitely better and, in support of the rise which has already occurred, the Administration quite evidently proposes to inject a "bootstrap operation" to still further reinforce the picture. Personally, I am inclined to think that the Industries Recovery Act will be of assistance and, although there are a lot of things about it which seem to me of doubtful expediency, nevertheless it contains one element of real value. It offers an opportunity and a challenge to industry to get together in a cooperative way, under certain restrictions, and has started a great mass of thought and action along what at least appear to be constructive lines. Manufacturers are no longer sitting still waiting for something to happen; they are now actively engaged in attempting to find how best they can utilize the leg-



**SOUTHINGTON
HARDWARE CO.**
Southington, Conn.
Wood Screws and Small
Tools
May, 60 per cent over April.



MORSE CHAIN CO.
Ithaca, N. Y.
Transmission Chain
April, 50 per cent over
March.
May, 16 per cent over April.
June will be 15 per cent
over May.



**CLEVELAND HARDWARE
& FORGING CO.**
Cleveland
Drop Forgings, Die Castings
April, 84 per cent over
March.
May, 25 per cent over April.



Foundry Equipment
April, 17 per cent over
March
May, 100 per cent over
April.

isolation which is imminent and apply it for their own and for the country's good.

Of course, something may happen which will give us all a chill, and relapses are dangerous affairs, but I believe that the stage is set for the beginning of the climb uphill, and most concerns are being managed today in such a way that a very little increase in business will translate the red figures into black. Once the balance sheet shows a profit, even if the profit is small, the whole mental attitude of the manufacturing employer changes.

The real test will be the degree and speed with which improving conditions can be translated into more employment and increased compensation for the workers. We must, with considerable rapidity, put earned money into the pockets of the working man in replacement of dole if we are to sustain the present turn for the better. This is evidently appreciated by the Administration, which lays great emphasis upon more wages as a condition of success, and I believe that the country will get behind the new plan and pull itself out of the hole.

Charles E. Brinley, President,
American Pulley Co.,
Philadelphia.

Expects Reaction in Second Half of 1933

THE outstanding point of interest in our business situation is the fact that orders, while not large, have been received from industries whom we have not sold for some time, and practically all of the business is for immediate delivery and not for stock.

Our humble opinion is—that while this present quarter has been more satisfactory than any similar period during the past two and a half years, we are not optimistic about the second half of the present year. We think

there will be some let-down, but that the dip will not be as great as the depression period. We further believe that an upturn will again assert itself later in the year. In other words, we are living in hopes, only, for the future.

Edward S. Gram, Vice-President and General Manager,
Crosby Co.,
Buffalo.

Does Not Expect Summer Slump

THE reports we receive from our field men are very encouraging, and we do not believe that we will experience the usual summer slump which has always been peculiar to our business.

George A. Powers, Secretary,
Hall Mfg. Co.,
Toledo, Ohio.

Looks for Normal Business by 1934

IT is, of course, anticipated that there will be an increased demand for construction equipment, through the recent Federal appropriation of three billion dollars, but we, ourselves, do not feel that the effect of this appropriation will become manifest to any great extent before fall at the earliest. There is no doubt, whatever, that this move will have a certain psychological effect, improving the mental attitude of the trade, but in actual business we do not look for any decided improvement for some time.

While we do not look for any real increase in the sale of construction machinery before fall, as mentioned above, we are of the opinion that a great many plants may be



Steel Castings
May, 25 per cent over April.
June, 50 per cent over May.



Electric Batteries
April, same as March.
May, 100 per cent over
April.



**General Metal Working
Machinery**
April, 70 per cent over
March
May, 30 per cent over April.



Bolts & Nuts
April, 16 per cent over
March.
May, 52 per cent over April.

repaired during the summer and early fall, in anticipation of increased business, as we are getting inquiries almost daily from some of our installations which have been inactive for from one to two years.

If this fall, state highway departments, counties, townships and municipalities make proper and adequate appropriations for construction work which were omitted to a large extent during the past two years, we feel that we can look forward confidently to something like normal business in the spring of 1934.

A. B. Shufeldt, President,
Universal Road Machinery Co.,
Kingston, N. Y.

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Farmer's Buying Power Will Await Next Crop

IT is probable that no large increase in sales of insecticides and farm machinery will come about until next season.

With any concern selling the agricultural trade it is a proposition of one turn-over a year. We do not expect the purchasing power of the trade we sell to show much improvement until at least one crop has been marketed at materially better prices.

J. B. Cary, Vice-president and General Manager,
Niagara Sprayer & Chemical Co., Inc.,
Middleport, N. Y.

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Better Credit Conditions Will Stimulate Tool Sales

WE feel exceedingly optimistic as to the future outcome of business in general and this concern, in particular, has been devoting more time than ever before to personal contact and at every plant we visit we find a tremendous need for replacement equipment in addition to the greatly improved high production equipment that we manufacture.

It looks as though when credit is eased on machine tool builders, in particular, will feel the improvement of business conditions in general.

Robert P. Gillham, Assistant Secretary,
Ferracute Machine Co.,
Bridgeton, N. J.

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Steady Improvement Over Last Half of 1932

WE are indeed pleased to advise you that during each of the first four months of this year we have booked orders amounting to approximately 30 per cent more than the average monthly business received during the last half of 1932. During the first four months of this year the amount of business received by us has remained approximately constant. During the month of May the volume of business with which we were favored was 100 per cent ahead of April.

This uptrend in our volume is very gratifying and we trust the "mystical corner" of which you speak is now behind us.

F. J. Stokes,
F. J. Stokes Machine Co.,
Philadelphia.

• • •

Advertising Increase Is Helping Monotype

LANSTON MONOTYPE MACHINE CO. April shipments were 5 per cent larger than for March, and May shipments were 21 per cent in excess of April. Our bookings up to June 13 are considerably in excess of the May bookings for the same period.

As you know, Monotype serves the printing trade and our volume of business is largely dependent on the volume of newspaper and periodical advertising, along with direct mail advertising. It is certain there is a



MATHEWS CONVEYER CO.

Ellwood City, Pa.
Conveying Machinery
April, 24 per cent over March.
May, 98 per cent over April.
June, to date (15), 50 per cent over May.



HARBISON-WALKER REFRACTORIES CO.

Pittsburgh
Refractories
April, 40 per cent over March.
May, 129 per cent over April.
June will be 200 per cent over May.
June orders, 1933, will probably be at least eight times the volume of June, 1932.



NEW ENGLAND BUTT CO.
Providence, R. I.
Wire and Cabling Machinery
April, 96 per cent over March.
May, 10 per cent over April.



UNION CHAIN & MFG. CO.

Sandusky, Ohio
Conveying and Transmission Equipment
April, 20 per cent over March.
May, 80 per cent over April.
June will be 50 per cent over May.



KINNEY MFG. CO.

Boston
Pumps, Clutches, Heaters
May, 144.7 per cent over April.
June will go well ahead of May.



BLISS STEEL PRODUCTS CORPN.

East Syracuse, N. Y.
Steel Windows and Doors
April, 278 per cent over March.
May, same as April.



MORRISON MACHINE PRODUCTS, INC.

Elmira, N. Y.
Collets and Feed Fingers for Machine Tools
May, 100 per cent over April.



AJAX METAL CO.

Philadelphia
Non-Ferrous Metals and Electric Furnaces
May, 5 per cent over April.
June will exceed May by 15 per cent.
June will be 50 per cent of normal. (Shipments)

BRUNNER MFG. CO.

Utica, N. Y.
Air Compressors, Paint Sprayers
April, 85 per cent over March.
May, 60 per cent over April.



Gas Appliances

April, 50 per cent over March
May, 12½ per cent over April.



Printing Machinery

April, 46 per cent over March.
May, 40 per cent under April.



ARROWHEAD STEEL PRODUCTS CO. Minneapolis

Automotive, Industrial and Agricultural Steel Products
April, 23 per cent over March.
May, 10 per cent over April.
June will be 10 per cent over May.



LANSING CO. Lansing, Mich.

Trucks, Wheelbarrows, etc.
April, 3 per cent over March
May, 30 per cent over April.



ATLAS STEEL CASTING CO. Buffalo

Open-Hearth and Electric Steel Castings
May, 100 per cent over April.
June will exceed May.



H. H. ROBERTSON CO. Pittsburgh

Metal Building Products
February, 100 per cent over January.
March, 50 per cent over February.
April, 14 per cent over March.
May, 18 per cent over April.



CROSBY CO. Buffalo

Sheet Metal Stampings
April, 80.6 per cent over March.
May, 9.53 per cent over April.



MILTON MFG. CO. Milton, Pa.

Bolts, Nuts, Bar Sections
April, 21 per cent over March.
May 28 per cent over April.
June will be 21 per cent over May.



AMERICAN PULLEY CO. Philadelphia, Pa.

Pulleys, Trucks, Stampings, Etc.
April, 4 per cent over March
May, 53 per cent over April.
June will exceed May.



ROBBINS & MYERS CO. Springfield, Ohio

Electric Motors and Specialties
May, 41 per cent over April.
June well ahead of May.



MOTOR IMPROVEMENTS, INC. Newark, N. J.

Automotive Appliances, Etc.
April, 61 per cent over Mar.
May, 23 per cent over April.
June, well over May

definite improvement in the volume of these classes of advertising and this, of course, is reflected in Monotype sales. We feel that we may depend on a gradual but certain upward trend.

Harvey D. Best, President,
Lanston Monotype Machine Co.,
Philadelphia.

Outlook Very Satisfactory

ADVANCES in prices of commodities have been quite general and steady for the past 60 days, which has caused similar advances in our products and the business outlook from the present viewpoint is very satisfactory.

F. O. Smith, Vice-President,
Vulcan Iron Works,
Wilkes-Barre, Pa.

President Is Doing a Fine Job

WE are optimistic in our viewpoints, feeling that the "corner" has been passed and look forward to the future with a great deal of optimism, combined with a sense of security not prevalent for the past several years.

We believe our President is doing a fine job in his economic program, looking toward stability of business and certainly building a better understanding between capital and labor, which in our opinion is a prime requisite for the continuance, success and growth of industry at large.

J. W. Fribley, President,
Cleveland Cap Screw Co.,
Cleveland.

Pleased With the Outlook

FROM all of our territories we get reports of increased business activity. We feel it a little early for the old established lines of industry to purchase welding equipment largely because they have not put to use the quantities of equipment which they have bought in the past. There is some increased activity in the newer lines, such as refrigeration and particularly the fabrication of sheet metal incident to the transportation of beer.

We are, however, pleased with the outlook in that we believe the manufacturing industry with this new activity will shortly find its present equipment inadequate for current needs.

W. H. Gibb, Vice-President,
Thomson-Gibb Electric Welding Co.,
Bay City, Mich.

Substantial Increase in Business and Inquiries

I AM very happy to advise you that our business has shown a very substantial increase during the last 45 days.

As to the outlook for the future, we feel more hopeful than for some time past judging by the number of inquiries, outstanding proposals, and quotations yet to be heard from.

William E. Bee, President and Manager,
Palmer-Bee Co.,
Detroit.

Inquiries Increasing

WE have been much encouraged over the increase in inquiries since the beginning of May.

H. M. Miller,
American MonoRail Co.,
Cleveland.

1931 Inquiries Now Coming to Life

WE feel that there is a very much increased activity throughout the entire industry which we serve. We are making more quotations at the present time than we have in any month in the year, and people are apparently seriously thinking of buying. Many of the prospects that we bid on in 1931 but which were eventually postponed



STRONG, CARLISLE & HAMMOND CO.
Cleveland
Machinery Dealers

April, 30 per cent over March.
May, 50 per cent over April.



MACWHYTE CO.
Kenosha, Wis.
Wire Rope

April, 9.5 per cent over March.
May, 31.2 per cent over April.
June well ahead of same month last year.



GLOBE STEEL TUBES CO.
Milwaukee
Steel Tubing

April, 60 per cent over March.
May, 35 per cent over April.



MYERS-WHALEY CO.
Knoxville, Tenn.
Shoveling and Loading Machinery

April, 9 per cent under March.
May, 13 per cent over April.



April, 9 per cent under March.
May, 38 per cent over April.



BAILEY METER CO.
Cleveland
Hydraulic and Other Meters

April, 15 per cent over March.
May, 50 per cent over April.



YOUNGSTOWN PRESSED STEEL CO.
Youngstown
Pressed Metal Parts

April, 28 per cent over March.
May, 21 per cent over April.
June will show good increase (Shipments)



CONSOLIDATED PACKAGING MACHINERY CORPN.
Buffalo
Packaging Machinery

May, 100 per cent over April, and about 50 per cent of normal.



REED MFG. CO.
Erie, Pa.
Vises and Pipe Tools

April, 22 per cent over March.
May, 15 per cent over April.
May volume was best in 15 months.



CHAIN BELT CO.
Milwaukee
Chain Belt and Conveyors

May, 22.8 per cent over April.



Hoists, Electric Trucks and Hardware

May, 58.8 per cent over April.

or abandoned have come to light again and are being refigured. There is in practically every case of a sale a demand for quick deliveries, and in some cases we are experiencing requests for special financing terms.

H. B. Neal, Treasurer and General Manager,
Kinney Mfg. Co.,
Boston.

Residential Building Gain Looked for Later

THE industrial building activity over the next few months, as we see it, will be mostly small additions to factories with a few garages and miscellaneous work thrown in. Residence building, we believe, will show a fairly gradual but uniform gain for the rest of the year. Price stabilization will undoubtedly have a big effect on sales as soon as it can be reflected in purchasing power.

R. H. Bliss, President,
Bliss Steel Products Corp.,
East Syracuse, N. Y.

Two Hundred Per Cent Increase in Last 40 Days

INTERNATIONAL REFINING & MFG. CO., one of the well-known cutting compound manufacturers, reports a substantial increase in the past 40 days, their sales going 200 per cent over any previous month this year.

Evanston, Ill.

Business Certainly Picking Up

WE have received numerous orders from customers who have not bought in as long as two years, and while the orders are not particularly large in size, business as a whole is certainly picking up.

Calbraith P. Champlin, President,
Strong Steel Foundry Co.,
Buffalo.

Expects No Summer Slump

THE first half of June indicates a possible 10 per cent increase over May. We are not expecting the usual summer fall-off in business to amount to much this year. Orders booked are showing only a slight fall-off. Should certain prospective business be let, we shall hold steady during the hot months. For the first time we are convinced that business is really improving; and we anticipate a busy autumn.

F. C. Bahr, President
Arrow Head Steel Products Co.,
Minneapolis.

Not a Temporary Pick-up

OUR more than 45 years of experience indicates that this is not a temporary readjustment. Our business is influenced only by a very tangible improvement in the basic industries, and this is the first indication that we have had of any prolonged upturn during the last three years. There is every evidence that the corner has been turned, and we are placing every confidence in this belief.

F. C. Doepke, Secretary,
Wrought Washer Mfg. Co.,
Milwaukee.

Expects Automobile Production to Double in Last Half

OUR survey of the automobile industry indicates that the last half of 1933 will be very much better than the first. Our guess is that automobile production in the last half of this year will just about double the production in the first half.

C. C. Carlton, Secretary,
Motor Wheel Corp.,
Lansing, Mich.

(To be continued in the next issue)

What the Industry Thinks of Industry Control

"Help Roosevelt Open the Door to a New Day," Says George M. Verity

By GEORGE M. VERITY
Chairman, American Rolling Mill Co.



GEORGE M. VERITY

IN signing the Industrial Control Public Works Bill on June 16, President Roosevelt stated: "History probably will record the National Industrial Recovery Act as the most important and far-reaching legislation ever enacted by the American Congress."

It is all of that and more. It is the most revolutionary and far-reaching piece of legislation ever injected into our American philosophy of life and of Government.

It contains almost unlimited power for good or ill, depending entirely on how its provisions are interpreted and administered, and on the support it receives from those it is intended to benefit.

At the end of a quarter century of unparalleled development in the arts and sciences and in industry, of high powered mass production, of insufficient distribution and of destructive competition, it opens the door and provides a means for the elimination of the ills, weaknesses and withering effect of conflicting effort even in peaceful pursuit. It provides for a reasonable control of the practices and methods pursued in production, distribution and employment, to the end that all unfair and unsound practices may be eliminated and honest and efficient endeavor rewarded.

The President further says that: "It represents a supreme effort to stabilize the many factors which make for the prosperity of the nation and the preservation of our American standards of business and of living." That its goal is: "The assurance of a reasonable profit to industry and better wages to labor, with the elimination of the piratical methods and practices (products of an extreme indi-

vidualism) which have harassed honest business and contributed to the ills of both management and labor."

It is a further primary purpose of this legislation to bring about greater stabilization through such regulation of hours of work as will insure employment to all those who desire it, and to increase purchasing power through a broadened earning capacity of all those who do their fair share of the constructive work of the nation.

It is in effect an enforcement of the "Share-the-Work" plan so suc-

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INDUSTRY is face to face with change. Industry control is the most momentous departure from accustomed practice that it has ever encountered.

We are learning, bit by bit, as the plans develop and unfold, what Government thinks of industry and what it wants it to do in attaining beneficial self-regulation. It is equally important that we know what our leading men think of both the principles and the details of the recovery plan.

For this reason, The Iron Age, in this issue, presents the views of George M. Verity, one of the steel industry's most able and respected leaders. In succeeding issues we shall present the views of other well-known men of high calibre, believing that these frank revelations of belief will be of great constructive value to all of us.

cessfully used during the tragic days of the depression.

All these plans and purposes deserve to be applauded and supported to the very limit of our ability.

In the carrying out of this general plan of Industrial Recovery, business is expected to create its own "Code of Ethics," to regulate its hours of work and rates of pay and to practically govern itself as heretofore, the only difference being that each industry or each segregated group must prepare its own Code, which is simply a working program in Washington for the President's approval as to its soundness and its fairness to all concerned.

If this radical and far-reaching plan proves to be practical and workable and it can be and is administered fairly and equitably, it certainly marks the beginning of a new day.

Those not engaged in industry cannot possibly appreciate the full significance of having a Court of Equity who can advise management just what it is fair and legal to do or not to do.

We have for the past forty years been working under so-called "anti-trust" laws, which no two courts could similarly interpret or define, to say nothing of a management or corporation attempting to do it. In many cases it was simply impossible to secure legal advice that could be depended upon.

This whole new order of things, brought into life to meet a national emergency, is so contrary to the apparent intent of the laws that now clutter up our statute books, that its constitutionality is questioned. However, if it is supported by government and business through voluntary agree-

ments, it is believed that its legality will not be challenged. If it works satisfactorily and does bring about a better order of things, the people can change or remove any law that is challenged.

As a part of the new deal that has been promised us, this is an experimental and far-flung effort to be helpful to all. The whole conception is, however, so gigantic in its proportions, so far-reaching in its effect, that it cannot be successfully administered by any single group representing government, except with the assistance and full cooperation of industry itself.

Each industry or segregated group must of necessity plan its program fairly, fully and efficiently, and take it to the coordinator in Washington in such clear and concise shape that it can be approved with a minimum of supervision.

American industry has been tremendously efficient in development and production; its efficiency in planning, in management and in successful cooperation with government in this "new partnership" is now clearly challenged.

President Roosevelt came into power under most unusual and dramatic conditions; the whole world was in travail, and America with its unlimited resources, human and material, had, due to lack of confidence and fear, reached a degree of general inactivity which approached stagnation. Neither the conditions which existed nor the unusual opportunities for service which presented themselves were of the President's making. He was chosen to direct us along new paths. He was quick to grasp an unprecedented opportunity and he has shown great courage, determination and ability in meeting every opportunity and emergency that has arisen, right up to the last day and the very last act of a Congress which was just as human as all those that have gone before.

We are sailing in uncharted seas; our happiness, our prosperity and the destiny of our children and our children's children rest largely on the character and strength of the support we, the People, continue to give our Commander-in-Chief in the great task he has undertaken.

Sharp Rise in Gray Iron Output in May

Production by Gray Iron Foundries during May increased to 71.4 per cent of normal, as compared with 52.7 per cent in April, according to the monthly report of the Gray Iron Institute. New business was 87.1 per cent of normal, as compared with 57.3 per cent in April.

Foundrymen Award Seaman Medal to Dr. Clamer

Dr. G. H. Clamer, president and general manager, Ajax Metal Co., Philadelphia, was awarded the Joseph S. Seaman gold medal of the American Foundrymen's Association, for outstanding achievement in the foundry industry. Presentation was made at the annual business meeting of the 37th annual convention of the association held June 20 to 23, at Chicago. The award was made primarily on Dr. Clamer's series of achievements in developing metal alloy.

Gear Manufacturers Working on Code

The American Gear Manufacturers Association with headquarters at Wilkesburg (Pittsburgh), Pa., is actively engaged in formulating codes required under the National Industrial Recovery Act, covering gears and pinions and speed reducers.

E. S. Sawtelle, chairman of the commercial standards committee, is heading up the development of code to cover gears and pinions, assisted by a large committee including H. H. Kerr, J. H. Jackson, F. H. Fowler, Paul Christensen, T. P. Horsburgh and Geo. F. Stahl.

E. P. Connell is chairman of the Speed Reducer group, assisted by L. R. Botsai as secretary, with the following sub-committees:

Helical and Herringbone Speed Reducers: E. P. Connell, chairman, W. G. Jones and F. H. Fowler.

Worm Gear Speed Reducers: Howard Dingle, chairman, J. W. Hertzler, and W. G. Jones.

Planetary Speed Reducers: R. C. Ball, chairman, and John Flagg.

Stove Manufacturers Form Institute

An Institute of Cooking and Heating Appliance Manufacturers was formed as a national body to represent stove manufacturers under the National Industrial Recovery Act at a two-day meeting held in St. Louis last week.

The meeting was called by the American Stove Association, a group of Southern manufacturers, headed by Bolling Jones, Jr., of Atlanta, Ga., but other groups attended. Irving S. Paull, trade association adviser, directed the organization, which will have headquarters at Washington.

A board of trustees was named to collect data concerning the industry and prepare a fair practice code as required by the law, as follows: D. W.

Bimms, Nashville, Tenn.; Clarence Graham, San Francisco; R. B. Hurt, Cleveland, Tenn.; David Kahn, Hamilton, Ohio; Maurice Klemme, Belleville, Ill.; A. W. Tallman, Taunton, Mass.; R. D. Wells, Rogersford, Pa.; George Wirth, Jr., New Athens, Ill.; Lewis Moore, Jr., Joliet, Ill.; A. F. Selman, Rome, Ga., and Mr. Jones.

Exporters to Tap R. F. C. Funds Through New Bank

The board of directors of the American Manufacturers Export Association on June 23 authorized the appointment of a committee to organize a central bank for foreign trade under the Federal Reserve Act. The primary function of this bank will be to assist in liquidating frozen funds and to supplement the existing banking facilities through the granting of longer term credits than are now available. It will, in this connection, have access to the acceptance facilities of the Reconstruction Finance Corporation.

James D. Mooney, president of the American Manufacturers Export Association, is expected to announce the personnel of the organization committee within a few days. The association will cooperate closely with the proposed bank, but without direct financial responsibility for its activities. All organizations interested in foreign trade are being invited to participate.

Gasoline Pump Manufacturers Organize

A group of about 32 manufacturers of gasoline pumps, oil dispensers and kindred equipment, have organized the Gasoline Pump Manufacturers' Association at Dayton, Ohio. William J. Donovan, New York, former assistant attorney general, will be counsel for the new association. A code of ethics and fair trade practices is being drawn.

Chicago Asks for Public Works Loan

WASHINGTON, June 27.—Formal application for an advance loan of \$36,000,000 under the \$3,300,000,000 public works program will be made soon by the Chicago sanitary district. The money is to be applied to the construction of sewage disposal works, for which \$139,000,000 will be required. Oral application for the loan was made last week. Col. Donald Sawyer, Public Works Administrator, asked that a formal application be filed. No public works projects will be awarded until after approval by President Roosevelt's advisory board, headed by Secretary of the Interior Ickes.

Technical Papers Share Spotlight with Recovery Act at Foundry Convention

TECHNICAL papers reached a new high point of excellence at the 37th annual convention of the American Foundrymen's Association, held June 20 to 23 at Chicago. Registration climbed rapidly and quickly soared far above the total of the previous annual meeting. Conferences were all well attended and in most instances discussion was free and to the point.

Recovery Legislation Discussed

Of primary interest were conferences held on the National Industrial Recovery Act. These meetings brought into intimate contact the A. F. A., the Gray Iron Institute, the Steel Foundry Society of America and a non-ferrous foundry group. It was stated in the course of these conferences that it is not improbable that the next 30 days will bring an increase of 30 to 40 per cent in direct labor cost in the foundry.

General opinion was that the administration at Washington will not

deal with small groups but wants to contact an entire industry. In this connection the A. F. A. is taking the stand that it is a technical society and therefore should not take a leading part in the formation of codes. However, it stands prepared to give all advisable assistance.

Common labor on which the minimum wage will be set was defined as that labor which is given the lowest rate of pay for an adult in the foundry. It was brought out that the labor clause may prove to be a boomerang to organized labor and it was suggested that labor may soon become a bitter enemy of the act. It was urged that even before a code is formulated the foundry industry should determine maximum hours and minimum wages.

Codes that will be framed will actually be contracts between an industry, its members, and the government. It was urged that foundrymen take direct action slowly but keep on the job recognizing that union labor is

working fast and already has definite ideas of hours and wages.

Act Does Not Alter Constitutional Rights

S. Wells Utley read resolutions adopted at a national industrial conference held June 20 at Chicago under the auspices of the National Association of Manufacturers. He added that the National Foundry Association will help all to deal wisely with the labor part of the bill. The resolutions follow:

WHEREAS, A detailed study of the price fixing provisions of the National Industrial Recovery Act reveals many possible controversies as to the real meaning of the act in its application to industry, and

WHEREAS, Too precipitate action in accepting and filing codes in advance of a careful and detailed study and complete information may result in embarrassment to individual industries and American business generally, and

WHEREAS, Without the interpretation of the act through the rules and regulations by the administrator there remain

FRANK J. LANAHAH, the newly elected president of the American Foundrymen's Association, is president of the Fort Pitt Malleable Iron Co., Pittsburgh. Mr. Lanahan comes to the presidency after serving the past year as vice-president, preceding which he served a three-year term on the A.F.A. board of directors.

Born in Pittsburgh, Mr. Lanahan received his education in the public schools there and has resided in that city continuously. He has been an active member of A.F.A. for a number of years, and is constantly active on a large number of technical, philanthropic, charitable and civic organizations. During the war Mr. Lanahan served as chairman of the Malleable Iron Industry War Service Committee and as chairman or member of numerous other committees engaged in war service work.

He is a director of the National Safety Council and Railway Business Association, and a member of the American Iron and Steel Institute, American Society of Municipal Engineers, American Society of Safety Engineers, Western Pennsylvania Engineers Society and many other groups. He also is vice-president of the Pennsylvania State Chamber of Commerce and a trustee of Carnegie Institute of Technology, the Carnegie Library and the Carnegie Museum of Pittsburgh.

Besides his connection with the Fort Pitt Malleable Iron Co. Mr. Lanahan is president of the Davis Brake Beam Co., Johnstown, Pa., and the Fort Pitt Mine Equipment Co., Jeanette, Pa., director of the Warren Foundry & Pipe Corp., Wharton, N. J., and chairman of the board of the Auto Tite Joints Co., Pittsburgh.





T. S. HAMMOND

THOMAS S. HAMMOND, retiring president of the American Foundrymen's Association, has been elected a member of the board of directors for the three-year term, 1933-1935. General Hammond served as vice-president in the year 1931-1932, and prior to that time on the board of directors. He is president and general manager of the Whiting Corp., Harvey, Ill.

General Hammond, who was recently appointed Brigadier-General in command of the 65th Infantry Brigade of the Illinois National Guard, was born at Crown Point, N. Y. He attended the University of Michigan, where he was an All-American football player in 1903-1905. He has been associated with the Whiting Corp. and with its predecessor the Whiting Foundry Equipment Co. since 1907, serving successively as assistant secretary, vice-president and secretary, and as vice-president and treasurer before being elected to his present executive positions.

Active in military circles since 1915, General Hammond served on the Mexican border in 1916, and during the World War overseas as colonel in command of the 124th Field Artillery, 33rd Division. He was decorated by General Gouraud of France in 1918 with the French Legion of Honor.

General Hammond is active in a number of industrial and commercial organizations, including the Foundry Equipment Manufacturers Association, National Founders Association, Illinois Chamber of Commerce, Chicago Association of Commerce, and the National Metal Trades Association. He also is president of the Illinois Manufacturers Association.

many disturbing and uncertain factors, therefore, be it

RESOLVED, That the associations of State manufacturers and industrial organizations constituting the National Industrial Council recommend to their constituent members more than ordinary caution in filing codes and agreeing to selling prices until such time, as a result of diligent study of the act, the most satisfactory, safe and workable code for industry can be worked out. And be it

FURTHER RESOLVED, That we applaud the efforts of the President to rehabilitate industry, but care should be taken not to sacrifice sound thinking for speed to the end that as a result of undue haste the nation's industry be further broken down.

WHEREAS, The National Industrial Recovery Act specifies certain requirements as to labor relations which must be included in codes of fair competition, and

WHEREAS, The act does not mention important existing legal rights, therefore, be it

RESOLVED, That every trade group shall be urged to carefully consider the advisability of inclusion in every code of the following provisions to follow the provisions specified in Section 7: (a) It is clearly understood that the foregoing paragraph does not impair in any particular the constitutional rights of the employee and employer to bargain individually or collectively as may be mutually satisfactory to them; nor does it impair the joint right of employer and employee to operate an open shop.

(b) Nothing in this code is to prevent the selection, retention and advancement of employees on the basis of their individual merit, without regard to their affiliation or non-affiliation with any labor organization.

WHEREAS, The stated purpose of the National Industrial Recovery Act is to increase the purchasing power of the American people by increased wages and more employment; the industries of America are fully in accord with this objective and declare their interests to protection of their workers in the procurement of this objective. As employers it is our declared intention to prevent the coercion of workers and that the rights of our workers as to wages, hours and working conditions shall be cared for, therefore, be it

RESOLVED, By the National Industrial Conference in convention assembled in Chicago on June 20, 1933, that we urge upon every employer the necessity of advising workers in his plant that the National Industrial Recovery Act does not destroy or affect their mutual right to operate on an open shop basis, and that he will endeavor to protect them in that right.

RESOLVED, That we reaffirm the open shop principle of employment.

Believes Recovery Act Is Now Unnecessary

Fred Sargent, president, Chicago & North Western Railway, said in speaking on "Business and Government,"

"Looking at the legislative program as a whole, we find that we have abandoned the individualistic system of progress and have plunged completely into a modern socialistic, co-operative program, with complete Governmental control over every

phase and branch of business activity in America.

"A democracy necessarily acts slowly, and it is not for me to question the wisdom of the Congress at this late hour in conferring these unprecedented legislative powers upon the President of the United States. It is, however, quite clear that the stage is set for a natural business recovery and that the emergency will pass before the legislative grants under the acts of Congress cease. I think that while this statement is in the nature of a prophecy, yet the logic of the situation seems to support it.

"We have been on the downward course in this depression for almost four years. During this time, there has been an enormous amount of under-consumption, not only in America but throughout the world. Consumption of goods, measured by carloadings, was about constant from 1926 to the middle of 1929, and from the latter date consumption of goods in America, measured by carloadings, has been on a rapidly descending curve until it reached its lowest point in February of this year. The trend is now upward.

"Not only this, but, in my opinion, nature is coming to the rescue of agricultural prices. All through America, indications are for a short crop, so that we may expect firmer agricultural prices, even without the aid of legislation.

"Unfortunately, we have had our eras of depression accompanied by great unemployment, hardship and suffering, and these conditions have appealed to the better sense of the better element of the American people in an effort to see if through government we might not improve the situation and thereby avoid recurring periods of depression in the future, giving more consideration toward suitable employment for the worthy men and women of the country, and enabling all to share in an even better distribution of the country's

R. J. TEETOR, general manager of the Cadillac Malleable Iron Co., Cadillac, Mich., has been elected a director of the American Foundrymen's Association for a three-year term extending from 1933 through 1935. Mr. Teetor will represent the malleable iron industry on the board of directors. He is a graduate of Purdue University, where he received his degree in mechanical engineering in 1905. On graduation he became connected with the Link-Belt Co., Indianapolis, remaining with that firm until 1915, when he resigned his position as chief engineer to become secretary of the Standard Malleable Iron Co., Muskegon, Mich.

During the world war he served as a major of infantry with the 84th Division until December, 1918, when he was transferred to the 83rd Division as divisional inspector.

On receiving his discharge from the army, he became vice-president and general manager of the Howe Chain Co., Muskegon, Mich., and in 1921 became interested in the iron and lumber interests of Cadillac, Mich. He established the Cadillac Malleable Iron Co. at that time, being active in the erection of the plant, and has since managed its operation as secretary and general manager.



R. J. TEETOR

wealth than has prevailed heretofore. If such a policy can be adopted and successfully administered without destroying the incentive to progress, without destroying individual initiative and enterprise, then such a policy is to be desired. The great fear, however, is that we may have to make over human nature before a socialistic regime will succeed. But regardless of what our fears may be, we are now in the midst of a revolutionary change that has come upon us without bloodshed and even without an expression of the people through the ballot box, for much of the legislation, forced no doubt through the sheer necessity of the emergency, was not involved as an issue by either of the parties in the last Presidential election.

"The combined legislation of the last Congress delegates legislative authority to the executive branch of the Government and moves us entirely out of the laissez-faire doctrine into that of a socialistic, cooperative and co-partnership arrangement between Government and all its various individual and corporate lines of activity. In this connection, I have tried to point out also that I have believed that the economic conditions were ripe for revival of industry and business; that our past history and experience should make us cautious, notwithstanding the suffering through which we have passed, about any revolutionary changes that would head us entirely away from the established theories and principles that have thus far enabled our people to have such a wide and universal distribution of our wealth in normal times. I have expressed these thoughts, realizing that we cannot turn back now, that the change is here, but rather, in the hope that in administering the new laws, we may keep as close to those sound, fundamental rules of government and economic principles that have guided us in the past as it is possible to do, and at the same time undertake through the recent legislation to bring about even a greater

GEORGE BATTY, who has just been elected a member of the A.F.A. board of directors, is technical director of the Steel Castings Development Bureau, Philadelphia.

Mr. Batty was born at Blackburn, near Sheffield, England. After completing his earlier education, he attended Sheffield University, specializing in the department of applied science, at which time he became interested in the early development of electric furnace melting of metals.

Entering the field of commercial production in 1909, Mr. Batty was employed as steel maker for the Darwin group of companies at Sheffield, remaining with this group until 1914 when he took a similar position with John Kenyon & Co., Ltd., another Sheffield firm. In 1919 he was appointed works manager of James Fairley & Sons, of the same city. After spending 1920 in the United States as a consultant, Mr. Batty served as technical director of the National Steel Foundry of Leven, Scotland, from 1923 to 1927.

Returning to this country in 1927, and after spending another year as a consultant, Mr. Batty assumed the important position of technical director of the newly formed Steel Castings Development Bureau. Mr. Batty has written extensively on steel casting problems for the technical press and has presented several papers before technical society meetings, including the A.F.A., on steel making and production of steel castings. He holds memberships in the American Foundrymen's Association and the American Society for Steel Treating.



GEORGE BATTY

era of prosperity and a greater distribution of wealth than we have experienced in the past."

Cooperation Between A.F.A. and N.A.P.A.

Since the 1932 convention the National Association of Purchasing Agents has approved the A. F. A. recommendations to purchasers of castings. These recommendations outline the information which the purchaser of castings should submit to the foundry when requesting estimates. At the request of the N. A. P. A. there have been submitted for its approval recommended specifications to be used in purchasing patterns. Slight changes have been recommended by the iron and steel committee of the N. A. P. A. and, if acceptable to the A. F. A., will be issued as approved by the two organizations.

F. J. Lanahan Elected President

New officers of the A. F. A. are: Frank J. Lanahan, Fort Pitt Malle-

able Iron Co., Pittsburgh, president, and Dan M. Avey, editor, *Foundry*, vice-president. The following directors were elected: R. J. Teeter, general manager, Cadillac Malleable Iron Co., Cadillac, Mich.; George Batty, technical director, Steel Castings Development Bureau, Philadelphia; R. F. Harrington, metallurgist, Hunt-Spiller Mfg. Corp., Boston; Dr. H. Ries, Cornell University; James L. Wick, Jr., president and general manager, Falcon Bronze Co., Youngstown, Ohio; and Thomas S. Hammond, president and general manager, Whiting Corp., Harvey, Ill.

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Working Conditions Improving

HOW to keep a foundry clean and in orderly condition, eliminating hazards to workmen arising from the presence of dirt and fine materials incident to manufacture, was the subject discussed at the foundry house-keeping conference. Dr. E. G. Meiter, Employers' Mutual Liability Insurance Co., Milwaukee, in a talk dealing with the dust problem in foundries, revealed that foundries in Wisconsin have experimented successfully with ventilation of the shakeout. He emphasized that in cases in which the dust hazard cannot be eliminated the employer should select and insist upon the use of proper respiratory equipment. He stated that working conditions for employees are improving and that further proper education will bring about the desired result.

Alfred C. Hirth, Williams, Eversman & Morgan, Toledo, Ohio, discussed the legal aspects and employers' liability in connection with the dust problem, with particular reference to silicosis. A. D. Lynch, Ohio



R. F. HARRINGTON

R. F. HARRINGTON, metallurgist of the Hunt-Spiller Mfg. Corp., Boston, has been elected a member of the A.F.A. board of directors to serve a three-year term. Mr. Harrington has been particularly active in association affairs for a number of years, serving on several important committees of the Gray Iron Division and of the Committee on Molding Sand Research.

A graduate of Tufts College in 1913, with the degree of B.S., Mr. Harrington has been associated with the Hunt-Spiller Mfg. Corp., for some 20 years, earlier as chemist in charge of laboratory work and now as metallurgist in charge of metallurgical operations, the testing of materials and molding sand research and conservation. He is the author of numerous papers for A.F.A. meetings and for the trade press, and is a member of the A.F.A., and the iron and steel committee of the American Institute of Mining and Metallurgical Engineers. He is a past-president of the New England Foundrymen's Association.

Brass Co., Mansfield, Ohio, described ways and means of enlisting the help of foremen and workers in maintaining a clean and orderly foundry.

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Hardness Testing in Quality Control

HARDNESS testing has been and will continue to be a satisfactory means of inspecting the quality of cast-iron articles, said A. L. Boegehold, General Motors Research Laboratories, Detroit, in a paper entitled "Wear Tests and Value of Hardness Testing for Control of Product." He stated that the value of hardness testing for control of product does not depend upon any broad relationship between hardness and other physical properties of cast iron. It can be shown, by selection of proper examples from various kinds of cast iron, that hardness has no relation whatever to strength, machinability or resistance to wear. On the other hand, the normal variation in hardness experienced during the daily manufacture of one grade of cast iron is directly related to these factors. After service tests have established the strength, wear resistance or other physical property limits necessary in the cast iron for a particular part, hardness tests can be made upon irons possessing properties at the upper and lower limits. These values for hardness then become an empirical yardstick which may be used as a convenient means for daily or hourly checking the product.

Mr. Boegehold declared that "just as physical properties of castings are calibrated in terms of hardness to get a control test to be used for rejection or acceptance of castings, another calibration may be made in terms of depth of chill obtained when the iron is cast against a chill block. This test is frequently used for testing the molten metal being poured into castings. It can be made long before a hardness test could be made on one of the castings, consequently any deviation of the iron from the quality desired is quickly realized and adjusted before too many castings are poured from 'off' iron."

Increased hardness, or the addition of elements which form hard constituents in the iron either by going into solution or by combining chemically, results in decreased wear, concluded Mr. Boegehold. He remarked that it is unfortunate that those who have published conclusions contrary to this have not given more details as to the microstructure and history of the metals tested or other details which might explain the deviation from a naturally expected result.

With many investigators each year reporting results on the wear test of cast iron, he said that it soon should

JAMES L. WICK, JR., president and general manager of the Falcon Bronze Co., Youngstown, Ohio, has been elected a director of the A.F.A. for the three-year term, 1933-35. Mr. Wick has been active in the association for a number of years, especially in the field of non-ferrous research.

Born in Youngstown, Ohio, in 1883, Mr. Wick received his technical training at Massachusetts Institute of Technology, graduating in 1906 with a degree of B.S. in Mechanical Engineering. During his summer vacations he worked in the plant of the William Tod Co., Youngstown, now a unit of the United Engineering & Foundry Co.

On leaving school he became associated with the Youngstown Sheet & Tube Co., Youngstown, and also with the Natural Light & Thorium Co. as assistant superintendent. In 1908 he became general manager and treasurer of the Crystal Ice & Storage Co., designing and rebuilding its plant. Returning to the Youngstown Sheet & Tube Co. in 1918, he served for a time as special agent for claims, and in 1919 became associated with his present firm, the Falcon Bronze Co. Beginning as secretary and assistant general manager, he became president and general manager in 1925.

Mr. Wick holds memberships in the American Foundrymen's Association, American Iron and Steel Institute, American Institute of Mining and Metallurgical Engineers, American Society for Testing Materials, and National Founders Association.



J. L. WICK, JR.

be possible to form a definite idea about the wear resistance of this material. After describing some of the tests made, he suggested how much better it would be if two or three types of wear tests could be selected and a standardized test procedure established for each type of test so that the results of each investigator's work could be correlated with every other work on the same subject.

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Sea Coal as a Facing and Bonding Material

An exchange paper of the Institute of British Foundrymen, entitled "The Action of Coal Dust as a Facing Material," and written by Ben Bird, Keen & Nettlefolds, Ltd., Newport, Mon., England, recounts the results of an investigation of the behavior of coal dust or sea coal when mixed with molding sand and used as facing in a mold.

There are several ways this coal dust functions in the mold. For brevity, these several functions may be grouped under two heads:

1.—The influence of the coal dust on the skin of the casting and the peeling of the sand from the casting. This is the usual interpretation of the reason for using coal dust in the molding sand.

2.—The influence of the coal dust as a binder in the sand. This is a newer conception of coal dust.

From his experiments, the author concluded that the volatile matter in the coal dust is driven off as a gas or heavy smoke. This acts as a carbon deposit both in the form of a gas and a soot to prevent the sand fusing on to the metal and thus producing a good skin and a good stripping action or peeling of the sand from the casting.

In dealing with the influence of the sea coal as a binder in the sand, the author states that the tarry substance released by the heat from the coal dust, being sticky, coats the grains of sand and acts as a bond and prevents scabs on the mold surface. This bonding action progresses back from the surface to some extent as the mold heats. The author also brings out that the carbon of the coal dust is cooked or coked in a thin film on the sand grains which functions in two ways: (1) it forms a binder, due to the friction of the coke; (2) the carbon makes the sand more refractory.

In his experiments the author used three kinds of sand with the coal dust:

- 1.—Molding sand—Stourbridge red sand as quarried.
- 2.—Sharp sand—Britton Ferry dune sand.
- 3.—Burnt sand—Old black sand from Stourbridge red with the carbon coating burnt off.
- 4.—Coal dust—Volatile 30.6 per cent, ash 10.4 per cent, carbon by difference 59 per cent. Fineness all through, 90 mesh.

Several experiments were run from each of these sands, from which the author drew his conclusions. As he recommends the use of coal dust as a bonding material to build up the bond in used or old sand, his experiment with burnt sand is to the point. In this case 15 per cent of coal dust was added to the burnt sand and milled for 3 min., and a test was made. Then 2½ per cent of coal dust was added, the sand milled another 3 minutes, and a second test made. The same procedure was followed for six tests. The permeability was reduced and the bond increased as the test progressed. The large amount of coal dust added at first has a mapping effect on the surface of the casting, but the surface improved as the test progressed. The tests with the sharp sand were quite similar to the ones with burnt sand.

The author states that he has used



DAN M. AVEY

DAN M. AVEY, whose activity in the American Foundrymen's Association extends over a period of many years, has been elected vice-president, following a three-year term as a director. Mr. Avey also is chairman of the committee on international relations and has served on numerous other committees of the association.

Born in Charleston, Ill., in 1888, Mr. Avey received his early education in the Mattoon, Ill., public schools. In 1910 he was graduated from the University of Illinois, Urbana, Ill., with the degree of B.S. in Civil Engineering. During his college vacation periods he was employed successively as rodman and transitman for the D. S. & M. Transit Co., in the maintenance of way department of the Big Four Railroad, and as assistant city engineer for Mattoon. On graduation from the university he became associate editor with *Municipal Engineering*, Indianapolis, from 1910-1912, and during 1912-1913 was assistant to the director in charge of publications of the Engineering Experiment Station at the University of Illinois.

For four years thereafter Mr. Avey was assistant cashier in a Mattoon bank, and in late 1917 he became associated with the Penton Publishing Co. of Cleveland, with which he has been connected ever since. In 1925 he became editor of *Foundry*, which position he holds today. Mr. Avey also is a member of the American Society for Testing Materials and the American Electrochemical Society.

coal dust as a bonding material in his foundry with satisfactory results, and suggests that it is worthy of investigation. He places special emphasis on the desirability of using a high-volatile coal dust, the volatile property being the source of the tar, which he considers the most important bonding material. Milling is necessary to bring out the bonding properties of the coal dust.

Production of Gray Iron in Electric Furnaces

THE production of gray iron in electric furnaces was the subject of two papers. C. R. Culling, superintendent, Carondelet Foundry Co., St. Louis, read a paper on the "Experience of a Gray Iron Jobbing Foundry with the Rocking-Type Electric Furnace." He emphasized the point that this type of furnace made it possible to make a wide variety of castings with improved qualities. This improvement is brought about through increased strength, increased density as desired, and better machineability in the denser, stronger materials. Factors leading to these results are the available superheat, deoxidizing atmospheric condition, and the absence of slag and oxide inclusions. The furnace makes it possible to adhere to definite specifications and to duplicate both chemical and physical properties after determining the proper mixture. The rocking furnace is flexible—a wide range of chemical analyses is covered in the production of regular grades of higher strength materials, including various alloys. It is as practical and economical to produce small batches of metal for special purposes as to produce a larger quantity of a base mixture.

A paper by Clyde L. Frear, metallurgist, DeLaval Separator Co., Poughkeepsie, N. Y., on "Gray Iron Production in the Direct-Arc Acid-Lined Electric Furnace," was read in his absence by Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va. Mr. Frear described the operations necessary to produce soft, easily machineable, but close-grained castings, even using a very large amount of steel and cast iron scrap, including chips and borings, and a correspondingly small amount of pig iron in the charge. He stressed the following essential points:

1. Correct building up and ramming of the hearth and repair of the hearth.
2. Elimination of silica from the slag on the surface of the bath.
3. Melting in such a way as to have the carbon content of the molten bath very close to the desired value, therefore requiring little reconditioning of this constituent.
4. Control of the graphite nuclei in the molten bath to produce the strength, machineability and other properties desired. (The number and size of the graphite nuclei are dependent on the graphite concentration of the original charge and on the temperature of the bath and the time of holding in the molten condition.)

Discussion

Following the presentation of Mr. Frear's paper, H. S. Austin, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., briefly stated his company's experience, declaring that its furnaces have been operated continuously throughout every week with relining or repairing done only over the week-end. Later in the discussion the fact was brought out that a small foundry using a 100-kw. electric furnace and operating it on a schedule of three 8-hr. shifts daily melted its iron at a cost of \$7 per ton. The scrap going into the furnace cost an average of \$5 a ton and the electricity was purchased at a flat rate of \$112 a month.

Clay and Permeability

In the discussion of the paper on "Grain Structure Effect on Mold Permeability Control," by H. W. Dietert and F. Valtier, Detroit, it was pointed out that a cast iron pipe maker controls permeability by the elimination of burned clay. This is accomplished by means of a very strong suction over the shake-out. Little good clay is lost by this method. Only a small addition of new clay is needed to retemper the sand to a permeability of about 700. It was stressed that a poor grade of clay lowers permeability. Another angle to the dust problem is the legal side.

Burned sand may also be eliminated by the wash method, which requires that 15 to 20 per cent of the sand be washed with water at given periods.

Dr. H. Reis, Cornell University, said that each year finds more small details of foundry operation being given close attention. His paper, of which R. C. Hills was co-author, was in the form of a preliminary report on the subject of the effect of silt on the bonding strength of clay. His tests so far indicate that the presence of silt decreases the bonding strength of clay. He raised the question of the advisability of separating silt from clay when making fineness tests.

Successful Air Furnace Melting

One of the earliest applications of the air furnace in the gray iron field was in the production of high-strength castings, stated D. P. Forbes, Gunite Corp., Rockford, Ill., in a paper dealing with air furnace cast iron. The author attributed much of the success of air furnace iron to the fact that the few foundries which produce it have available skilled metallurgists and laboratory equipment to insure intelligent manufacture and uniformity of the metal. He described the melting operation in the air furnace and conditions under which it is profitable to duplex from the cupola to the air furnace.

Mr. Forbes pointed out that air furnace iron differs from cupola iron in strength and hardness and from electric furnace iron in hardness, when comparable analyses are assumed. The use of the air furnace permits the production of iron having a low carbon content and likewise facilitates the introduction of alloys. While it is customary in high-test iron to keep the carbon content below 3 per cent, iron containing less than 2½ per cent is rarely made commercially. However, it is possible to produce iron with the carbon as low as 2 per cent.

Discussing the important factors in

successful air furnace melting, Mr. Forbes stressed (1) the design and proportions of the inside of the furnace, (2) selection of materials and melting stock, (3) scrupulous adherence to a definite program of operation, (4) skill and experience in testing the metal before tapping and

judgment in applying correctives, if needed, and (5) attention to the resulting physical and chemical properties of metal from each heat so that minor variations can be corrected in subsequent heats before serious divergence from standard practice occurs.

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Structure from Heat Treatment Determines Dynamic Properties of Steel Castings

IMpact test results of steel castings give more reliable information on the capacity of cast steels to resist shock in service than do test results on tensile strengths and elongations. This is the contention of Fred Grotts, director of metallurgy, Continental Roll & Steel Foundry Co., East Chicago, Ind., in a paper, "Dynamic Properties of Steel Castings," read at one of the sessions at the annual convention of the American Foundrymen's Association in Chicago, June 20 to 23.

Early published data on this subject indicate, according to the author, that impact tests may be of great value in specifications and may provide the explanation for many mysterious failures of castings. To clarify this subject, Mr. Grotts presents the results of a series of researches conducted over a considerable period of time.

One of the cases cited is that of failures of 3.50 per cent nickel steel airplane axles which were given special heat treatments—quenching in oil from 1550 deg. F. followed by a draw at 1000 deg. Despite satisfactory physical tests, these axles failed. It was found that their Izod impact values varied from 6 to 12-ft.-lb., but on steel of the same analysis impact values of 40 to 60 ft.-lb. were often obtained, while the elongation and tensile strengths were approximately the same as those from failed parts. This was evidence that the heat treatments were not constant. Failures due to low impact values were eliminated by establishing proper manufacturing practice, heat treatment and close inspection control.

Tank and tractor castings are subjected to severe shock and often fail, despite excellent tensile strengths and elongation. The author shows that a study of the proper heat treatment for such castings resulted in demonstrating that, if the carbon steel castings were full-annealed, then quenched in warm water and drawn, a structure is produced having a minimum of free ferrite. Reduction of area increased as the quantity of free ferrite was reduced and resistance to dynamic stresses increased as the fine-

ness of the structure increased. The castings gave fine service. Experiments with medium manganese, chrome-nickel and vanadium steel castings showed improved results, especially when given a treatment that resulted in a minimum of free ferrite. Additions of nickel or vanadium seemed to increase the toughness or resistance to shock.

Examination by the author of carbon castings for freight car equipment, where high impact values are needed, revealed some interesting facts. He clearly shows that side frames for freight car trucks, after full annealing, possessed good physical properties, but the Izod impact was only 12 ft.-lb. Full annealing and normalizing raised all values, the Izod going to 22 ft.-lb. But full-annealing, quenching and drawing produced the highest values with the Izod value at 40 ft.-lb. While the tensile strength and elongation raised only slightly, the impact values went from 12 to 40 ft.-lb. The microstructure is the secret—"observations in general thus far seem to show that when the ferrite

is in solution and etching reagents indicate a sorbitic structure, performance under dynamic stresses is highly satisfactory."

To obtain the best results as indicated by service and impact tests, heat treatments are of special importance, says Mr. Grotts. Similar steels, given different heat treatments, may give similar tensile strength results, but vary widely in impact resistance. Accumulated evidence seems to indicate that many unknown failures are traceable to poor dynamic properties, and that good resistance to dynamic stresses results from a certain fineness of structure, or ratio of free ferrite.

Inclusions of various types have much to do with impact values and angular inclusions are more objectionable than round ones, it is further contended. No noticeable relationship was observed between tensile strength and impact value. Tensile strength has, however, a relationship to fatigue resistance. There seems to be a relationship between the yield point and impact values; in certain cases an increase of yield point was accompanied by increase of impact resistance. Elongation had no noticeable relation, in general, but in practically all cases the impact value varied with the reduction of area value, good reduction attending good impact resistance. Brinell hardness and impact values have no connection.

The author's observations show that fatigue resistance varies with impact resistance, in that failure from repetitions of a measured stress are greatly reduced when materials have high impact value. This is pointed to as an interesting feature, because fatigue value has a relationship to tensile strength, whereas impact value has none. Still there is a distinct relationship between impact resistance and fatigue resistance. Grain structures as shown by micrographs indicate the probable impact values. Lack of ability to resist impact has been the cause of many so-called mysterious failures encountered in service.

Discussion

In a discussion of impact tests in connection with Mr. Grotts' paper, it was pointed out that the degree of sensitiveness to variation in form of the surface of the notch depends on the character of the material being tested. It was suggested that several cuts be taken, the last a very fine one so as to assure uniform results. Grinding and the use of formed cutters are satisfactory, it was asserted, if the radius at the bottom of the notch is reasonably accurate. The lack of standards for impact testing, it was stated, should lead to caution when interpreting the results of tests. It was emphasized particularly that there should be a definite standard for the manner in which the notch is made.



REBECCA HALL, consulting metallurgist, Chicago, who contributed a paper on high-strength, wear-resistant malleable iron.

French Exchange Paper

When the manganese content of cast iron exceeds 2 per cent, martensitic quenching is favored to such an extent that medium-size pieces with a thickness of 27 mm. (1.06 in.) could take a martensitic structure simply by cooling in still air, according to investigations described in the exchange paper of the French Foundry Technical Association, prepared by G. R. Delbart, Ateliers des Anciens Etablissements Cail, Denain, France, and presented in his absence by H. Bornstein, Deere & Co., Moline, Ill.

Following the work of Guillet, Galibourg and Ballay, the investigations reported by M. Delbart included a number of experiments made particularly to study the suitability of martensitic quenching of irons having a low content of total carbon and a high manganese content. It was discovered that a low carbon content improved the mechanical properties of the metal and considerably reduced the danger of microscopic cracks or fissures due to rapid cooling, notwithstanding the presence of a high manganese content. It also was found that low total carbon and high manganese contents increased the stability of irons subjected to heat, an especially desirable quality in irons which are to be heat treated.

A very low content of total carbon should be avoided because of the decrease in castability, the rapidity with which the metal passes from the liquid to the pasty state and its aptitude to piping. A content of about 2.50 per cent is suitable when melting iron in the cupola. In the electric furnace, which permits the iron to be superheated, one can obtain interesting mechanical properties with a carbon content of about 2.80 per cent. The author concludes that one can foresee interesting combinations which can be used in practice in the preparation of nickel-manganese irons with low total carbon content and high manganese content. Similarly, one could expect to see the nickel neutralize the action of the manganese on the primary quenching (hardening) which in any case is slight. The results of the tests showed that a low carbon content, or superheating, contributed to the enhancement rather than the depreciation of the qualities of the iron.

Oppose Straight Limestone Slag in Cupola

R. H. Bancroft and A. C. Myers, Perfect Circle Co., Newcastle, Ind., in a paper read by the former, described tests which they have conducted to determine the relation of slags to cupola operation and to metal structure. The investigation revealed that



DR. H. RIES

the presence of magnesia in cupola slag, obtained by the use of dolomite as a flux, improves the fluidity of the slag; that the addition of fluorspar to the flux also contributes to greater fluidity; and that slags of improved fluidity better combustion conditions to such an extent as to afford a distinct economy in coke and a smoother performance making for ease in manipulation of the cupola.

The tests showed that straight limestone as a flux gave slags of relatively poor fluidity, made cupola performance difficult and resulted in harder iron. In fact, straight limestone slags were associated with an apparent increase of silicon content of the iron melted, which may be a contamination of the iron by silicon oxide. Slags appeared to leave characteristic microstructure in the irons melted with them. It also was determined that the chemical nature of the refractory lining seems to alter the analysis and behavior of the slag and indirectly of the iron. All of the tests made thus far by the authors bear out the fact that slag reactions are of considerable importance in gray iron melting.

In the discussion of this paper Jesse Stoddard, Detroit Testing Laboratories, Detroit, emphasized that in order to secure good results it is necessary for the slag to be of the proper viscosity. Henry M. Lane, Hickman-Williams Co., Detroit, said that when slag becomes too sticky, salt can be applied effectively to make it more mobile.

Report on Bureau of Standards Study

A preliminary report of an investigation to determine the effect of

DR. H. RIES, newly elected director of the American Foundrymen's Association, is well known to the foundry industry not only as head of the department of geology, Cornell University, Ithaca, N. Y., but also for his many contributions to research work on molding sands. He is technical director of the A.F.A. committee on molding sand research, and is also a member of several other groups active in sand investigation work.

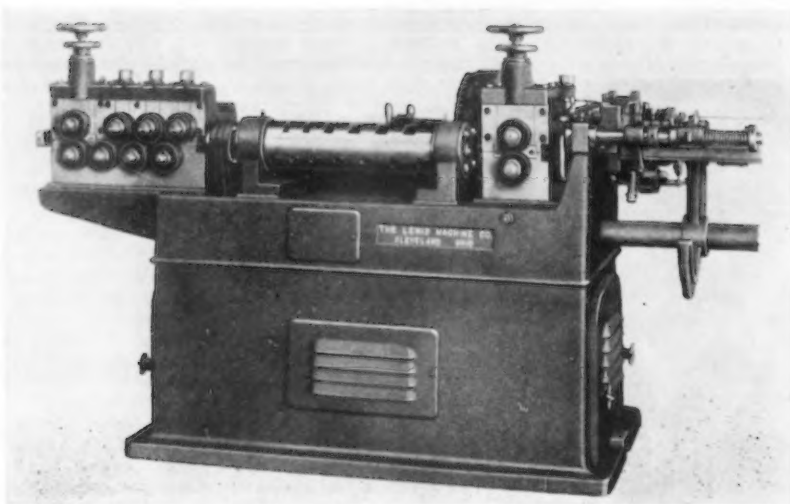
Born in Brooklyn, N. Y., in 1871, Dr. Ries acquired his technical training at the Columbia School of Mines, New York, receiving the degrees of M.A. and Ph.D. An authority on clays and molding sands, he has published a number of papers on this subject and has prepared numerous reports on sands for various State and national geologic surveys. He also is author of several works, including "Economic Geology," "Clays—Occurrence, Properties and Uses," and with T. L. Watson, "Engineering Geology."

Dr. Ries is a member of the American Institute of Mining and Metallurgical Engineers, Canadian Mining Institute, American Foundrymen's Association, American Ceramic Society (of which he is also a past-president), Geologic Society of America, and English Ceramic Society. He is a past-president and fellow of the English Ceramic group, and also is a member and former chairman of the A.I.M.E. committee on non-metallic minerals.

maximum heating temperatures on the physical properties of different types of cast iron was presented in a paper by C. M. Saeger, Jr., and E. J. Ash, Bureau of Standards, Washington, which was read by Dr. James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala. The paper described the methods and results obtained in a study of three types of cast iron.

Four heats, all melted in a high-frequency induction furnace, were made for each class of iron with maximum heating temperatures of 1400, 1500, 1600 and 1700 deg. C. (2550, 2730, 2910 and 3090 deg. F.), respectively. Four duplicate transverse test bars of different diameters were cast from each heat in a dry sand mold and the following properties ascertained: transverse breaking load, deflection, modulus of rupture, modulus of elasticity, hardness, density and microstructure. The shrinkage and running qualities of the irons likewise were investigated. The transverse breaking strength for each iron changed with the maximum temperature to which the liquid iron had been heated, and for two types of iron the maximum strength for each size of bars was obtained at a different maximum temperature of the liquid metal.

In general, the density of the solid metal and the linear contraction increased with the heating temperature of the liquid metal, whereas the density in the liquid state was not affected. The running quality of the irons investigated was apparently not affected by the maximum heating temperature, but was found to be a function of the liquidus temperature, being inversely proportional to the solidification range. The microstructure of the 1.2-in. bars indicated that irons of highest strength have relatively small graphite flakes and a pearlitic-sorbite matrix.



Wire Straightener and Cutter Has Splash-Lubricated Drive Gears

COMplete inclosure of drive gears in oil-tight housing and use of feed and flywheel transmissions for production work and cutting of short lengths are outstanding improvements on the new wire straightening and cutting machine recently brought out by the Lewis Machine Co., Cleveland. Gears and bearings in each housing are lubricated by the splash system. The construction is emphasized as sealing the driving mechanism from dust and dirt, eliminating frequent oiling, and substantially increasing the service of these vital parts of the machine.

The wire is cut by a quick-acting cam and lever. Only a small fraction of a revolution of the flywheel is required for cutting, thereby leaving the remainder of the revolution for feeding the wire through the machine. The cut-off time is reduced to a minimum, and marking or swelling of the wire is said to be practically eliminated.

This machine is available with a four or six-roll straightener ahead of the rotary straightener. Lower straightener rolls are power driven and each upper roll has a separate adjustment, the last or leveling roll lining the wire up with the center of the arbor. A set of rolls ahead of the straightener rolls feeds the wire through before it is picked up by the front set of feed rolls. The entire front feed housing assembly is arranged for vertical adjustment to allow for roller wear.

Straightener arbor, flywheel and all continuous running shafts are mounted on Timken roller bearings; there is a total of 31 anti-friction bearings on each machine. Drive gears, as well as clutch striker plate and key, are made of alloy steel and heat treated. The 15-hp. driving motor is inclosed in the base and connected

directly to the straightener arbor and intermediate drive shaft by V-belts.

An improved guide bar mechanism is furnished for handling the wire as

New Line of Power Squaring Shears

A LINE of power squaring shears designated as the series M has been placed on the market by the Niagara Machine & Tool Works, Buffalo, N. Y. Housings are semi-steel castings, heavily ribbed and well filleted, and the bed and crown, also made of semi-steel castings, are of box section and bolted and doweled to the housings, making a strong, rigid frame. A feature emphasized is the independent chuck carrying the lower knife, a construction that permits permanent location of the bed and facilitates adjustment of knife alinement.

The crosshead that carries the upper knife is counterbalanced with

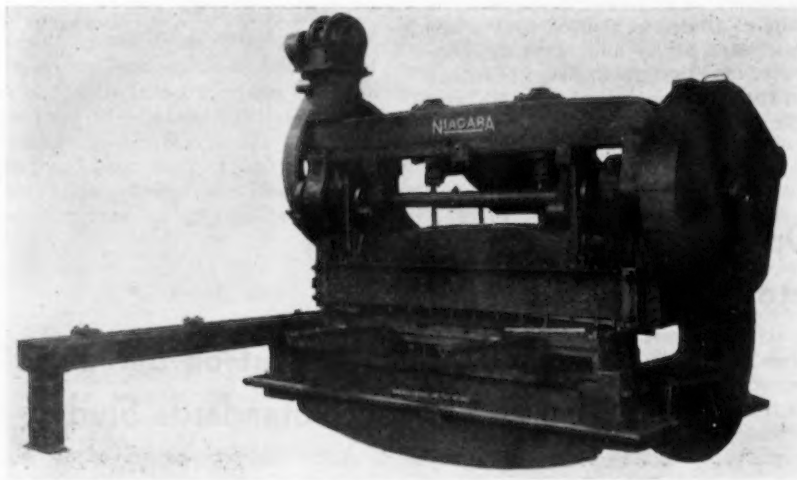
it is being cut. The shutter is timed to open with the knife, thus preventing sagging of the cut piece and assuring a square cut end on each wire with minimum burr. A new combination gage wire stop and release mechanism releases the wire as it is being cut and leaves it free to drop out of the guide bar.

It is stated that use of transmissions makes the new machine operate with equal efficiency on any kind of wire, and particularly for cutting lengths under 20 in., such as welding rod, special bolts, etc. Slow feeds for accurate work on high-carbon wire are obtained simply by shifting a lever, medium and high feeds are as readily available for general run, commercially straight work. Lengths under 20 in. may be run without using the clutch simply by selecting proper flywheel speed with the flywheel transmission lever. The required length of wire is fed through the machine during the dwell of the cut-off cam, making possible, it is said, the cutting of more than 100 short rods a minute without shock or excessive wear on the machine.

The capacity of the machine is 3/4-in. high-carbon steel wire and from 5/32 to 7/16-in. mild steel wire.

air cylinders mounted in the crown. These cylinders connect directly to the regular air supply of the shop and are said to operate with practically no loss of air in that the down stroke forces the air back into the line. The large eccentrics that operate the crosshead are forged integral with the main shaft and are supported on both sides by substantial bearings to give maximum strength at the point of load application.

The company's patented holddown, each foot of which is arranged with an individual spring cushion, is employed on these machines. The feet are self adjusting for different thicknesses of material, building up pressure as the thickness of material increases. Sheets shorter than the maximum length capacity of the shear are gripped uniformly without tilting



the holddown, whether the sheets are cut in the center of the shear or at either end. The shear may be used for cutting full capacity plate at one end and light gage plate at the other at the same stroke.

All gears have cut teeth to assure quiet operation and maximum strength. A powerful jaw clutch with

hardened tool steel inserts on both striking and backlash surfaces is employed. Belted motor drive is standard. The shear illustrated is equipped with the short-center flat belt drive with the tension maintained by a ball-bearing idler pulley actuated by a compression spring, a type of drive emphasized as quiet and efficient.

Optical Instrument for Routine Testing of Small Gears

THE optical gear tester illustrated is a new product of the Societe Genevoise d'Instruments de Physique, Geneva, Switzerland, and is being marketed in the United States and Canada by the R. Y. Ferner Co., Investment Building, Washington.

Unlike most projection instruments, it does not project an image of the teeth of a gear, but throws on a graduated screen a rectangular shadow of a signal plate by which on the horizontal ordinate of the screen one reads the variations of eccentricity of the gears and on the vertical ordinate the errors of pitch. Operation is rapid and the instrument is suitable for routine testing.

Capacity is for gears up to 4 in. in diameter, and it is said to be practicable to test gears as small as 0.16 in. in diameter. Feelers, or the contact anvils with which to make settings, are regularly provided for modules of 0.5 to 2.0 mm. or for diametral pitches of approximately 50 to 12. Feelers can be supplied, however, for diametral pitches up to 100, or for a maximum diametral pitch of 10. Direct readings of divisions of the scales can be made to 0.0002 in. or estimated to 0.00005 in.

Gears are mounted on mandrels between adjustable centers that are supported on a heavy cylinder, the position of which can be adjusted accord-

ing to the diameter of the gear by rotating the handwheel at the left. Also mounted on this cylinder is a ratchet device operated by a Bowden cable by which the gear can be stepped around one tooth or more at a time.

A pair of interchangeable feelers are mounted on supports, to which a light spring pressure is applied to engage them between the gear teeth. The upper feeler is fixed during the test and serves merely to index the gear. Pitch measurements are made by the movement of the lower feeler with reference to the upper. The lower feeler is carried on a floating arm which swivels to right and left and tilts up and down without any play. The other end of this arm carries a rectangular steel plate about 0.005 in. thick, with edges lapped square to each other.

This signal plate is cemented between two plates of glass to avoid any accumulation of dust on the edges, any dust on the surface of the glass being out of focus. Two adjusting screws serve to hold the signal plate exactly in the focus of a microscope with objective of large aperture and a projection ocular. A condenser with a 50-watt light behind it, operated through a 110:6 volt transformer, projects the shadow of the rectangular signal on to a mirror and from thence to the screen. The mirror is

optically flat, is silvered on its front surface and protected from oxidation. A green filter is provided in the optical system to relieve the user's eyes in routine testing. The screen is shielded against direct light so that measurements may be carried out under normal light conditions.

The arm which carries the optical signal and the lower feeler, being movable up and down about a central pivot, shows the variations in pitch. The same arm can be swung to the right or left about the upper of two pivots, to register the variations in eccentricity. Thus the same, lower, feeler gives both errors simultaneously.

Improved Carbide Light

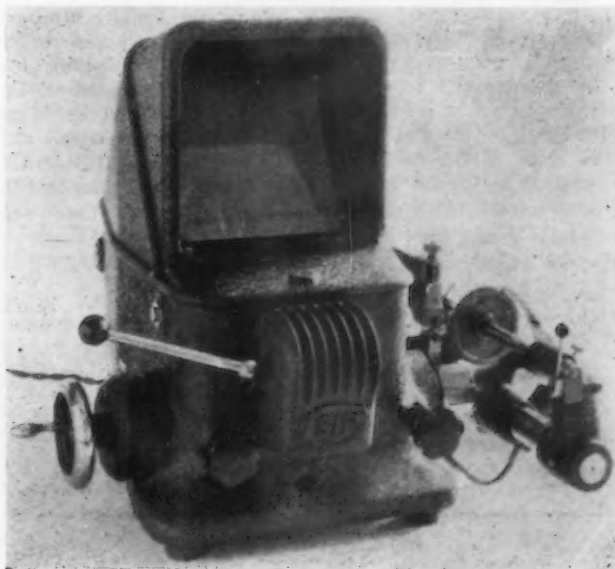
IMPROVEMENTS in the V-G Handy-Light, No. Y-199, distributed by the National Carbide Sales Corp., Lincoln Building, New York, include a new base which has been



redesigned to provide greater stability as well as improved appearance.

The light is adapted for emergency and other work requiring a powerful light that is easily handled. It weighs only 23 lb. when fully charged, and produces 1500 candle power for five hr. on only 1½ lb. of National 14 N.D. granulated carbide. As more than 75 per cent of its weight is on the bottom, the light is not easily tipped over; but if it should be overturned, the light will continue to operate satisfactorily if righted again.

Round die screw plates designated as the O. K. Junior have been placed on the market by the Greenfield Tap & Die Corp., Greenfield, Mass. The line consists of 20 different sets of commonly used taps and dies, etc., in sizes from 4-36 to 12-24 machine screw and ¼ to ¾-in. fractional.



▲ ▲ ▲
Gear tester at right checks pitch and eccentricity of gears ranging from 4 in. to 0.16 in. in diameter.

▲ ▲ ▲
The Niagara shear on opposite page has an independent chuck for lower knife, and a patented holddown, each foot of which has its own spring cushion.

R. F. C. Loans For Construction Projects

WASHINGTON, June 27.—Approximately \$1,800,000 will be spent for materials to be used for completing the five-mile subway in Newark, N. J., which has been granted a loan of \$2,850,000 by the Reconstruction Finance Corp.

Other self-liquidating loans made the past week by the Finance Corporation include the following:

To subsidiary of Todd Shipyards Corp., New York, \$1,100,000 for construction of ship repair and dry dock plant on Houston, Tex., canal. Materials to cost about \$600,000.

To Unified Rehabilitation Corp., Los Angeles, additional commitment of \$500,000 to be used in earthquake reconstruction.

To Rehabilitation Corp., Auburn, Me., additional commitment of \$400,000 to be used for fire reconstruction work.

To Rehabilitation Corp. of Ellsworth, Me., additional commitment of \$250,000 to be used for fire reconstruction work.

To Wildwood, N. J., \$325,000 for construction of new main pipe line, new pumping engine and other improvements of water supply system. Materials will consist of 3,500,000-gal. pump, 2937 tons of 24-in. cast iron pipe; 342 tons of 16-in., 265 tons of 14-in., 281 tons of 12-in. and 500-ft. of 24-in. flexible joint cast iron pipe.

To Ford County Housing Association, \$155,000 for construction of 100 low-cost houses near Dodge City, Kan.

To East Lyme Water Co., East Lyme, Conn., \$100,000 for new waterworks system. Materials to cost about \$58,000 and will consist chiefly of cast iron pipe. Other requirements will be pumping stations, two Diesel engine pumps and 718,000-gal. welded standpipe.

To Eau Claire, S. C., \$67,500, water supply system. Materials will cost about \$50,000 and will include water filtration plant of 500,000-gal. capacity, two 500-gal. per minute capacity pumps, one mile of 8-in. cast iron pipe.

To Burt-Washington Drainage District, Tekamah, Neb., \$60,000 for construction of two settling basins.

To Borough of Monaca, Beaver County, Pa., \$40,000 for improvements to water system. Materials to cost about \$24,000, and will consist chiefly of 3.2 miles of cast iron pipe, small pumping station, and 150,000-gal. standpipe.

To Springville, Ala., \$16,000 for waterworks system.

To Honaker, Va., \$25,000 for waterworks system.

To Santaquin Corp., Santaquin City, Utah, \$22,000 to replace five miles of wooden stave pipe in water supply system with cast iron pipe.

To Elks Rapids, Mich., \$10,000 to construct new pumping station, a 75,000-gal. elevated steel storage tank and necessary connecting pipe lines for water supply system.

To the Saratoga Springs Authority, Saratoga Springs, N. Y., \$3,200,000 to develop health resort in that place.

To the Country Urban Water Co., Kansas City, Mo., \$255,000 for new water supply system in Kansas City suburbs.

Bridge across Laguna Madre, between Port Isabel, Tex., and Padre Island, off coast of Texas, \$225,000.

To Denver Produce Market Co., \$213,000

for construction of produce market in Denver, Colo.

To Columbia, S. C., \$163,000 for building of athletic stadium and water storage tank.

The Reconstruction Finance Corp. completed its self-liquidating operations yesterday. The functions are transferred to the Public Works Section of the National Recovery-Public Works act.

\$400,000,000 Allotment For Road Construction

WASHINGTON, June 27.—Formal allotment of \$400,000,000 for use in road construction was made to the States last Friday by the Public Works Administration. These funds will become available July 1 and will mark the first part of the \$3,300,000,000 public works program to be started. At the same time \$135,000,000 was allotted to the War Department for reconditioning army posts and national cemeteries. The largest road fund allotted is \$24,244,024 for Texas. Among other State allotments were: New York, \$22,330,101; Pennsylvania, \$18,891,004; Illinois, \$17,570,770; California, \$15,607,354; Ohio, \$15,484,592; Michigan, \$12,736,237; Missouri, \$14,180,306; Minnesota, \$10,658,569; Georgia, \$10,091,185; Kansas, \$10,089,604; Iowa, \$10,055,660; Indiana, \$10,037,843; North Carolina, \$9,522,293.

Rules and regulations covering use of the funds also were announced by Public Works Administrator Donald Sawyer. One regulation requires that preference in purchasing materials must be given to materials produced under codes approved by the National Recovery Administration.

Headquarters of the Public Works Administration have been established in the Interior Building.

Code To Be Prepared For Job Stamping Plants

At a meeting of the Pressed Metal Institute held in Buffalo, June 24, the operation of the Industrial Recovery Act was discussed with particular reference to the interest of custom or job-stamping plants.

After a talk by Fred M. Rayburn, district manager of the Department of Commerce, and a series of questions and discussion, the following committees were appointed:

Organization and contact, C. C. Carlton, secretary, Motor Wheel Corp., chairman; fair trade code, R. F. White, vice-president, Mullins Manufacturing Corp., chairman; labor, J. Kramer, assistant treasurer, Hart & Cooley Mfg. Co., chairman; cost system, E. H. Wildt, assistant treasurer, Motor Wheel Corp., chairman.

The committees met immediately after the meeting and started active work. Committee meetings will be held promptly and are planning to report to the next meeting of the Pressed Metal Institute, which will be held just as soon as possible.

The present plan is to get in touch with every stamping plant interested in job stamping work in order that it may know of the activities in connection with the drawing up of the fair trade code for presentation at Washington. Any plants thus interested which have not received a letter from the central office of the Pressed Metal Institute by July 5 will receive full information if they will write Malcolm Baird, secretary-treasurer, 232 Delaware Avenue, Buffalo.

I. C. C. Cancels Joint Rail-Barge-Rail Rates

WASHINGTON, June 27.—The Interstate Commerce Commission has ordered cancellation of proposed joint rail-barge-rail rates on pipe and related articles from the Youngstown, Ohio, district to destinations in the Southwest. It also held not justified the proposed cancellation of joint rates on iron and steel articles from points in Pennsylvania, Ohio and West Virginia to destinations in the Southwest in connection with the American Barge lines. At the same time the Commission approved of the filing on not less than five days' notice of schedules publishing rates from Youngstown and points taking the same rates not less than the present barge-rail rates from Ambridge, Aliquippa and Glassport, Pa., to Southwest destinations.

The proposed joint rail-barge-rail rates from Youngstown were protested by pipe manufacturers in the Pittsburgh district and Lorain, Ohio, and the American Barge lines because they would be less than present levels from Pittsburgh and Lorain. The proposed rail-barge rate of 74.5c. per 100 lb. on pipe from Youngstown to Dallas, Tex., by rail to Aliquippa, Ambridge or Glassport, thence by barge to Memphis and rail beyond was based on a differential of 11c. under the all-rail rate and is 3.5c. per 100 lb. lower than the barge-rail rate applicable from Aliquippa and Ambridge in the Pittsburgh district.

A new deposit of ilmenite, zircon and monazite has been found in Travancore State in South India and the owners F. X. Pereira & Sons are now in active production. Golwynne Magnesite & Magnesia Corp., Chrysler Building, New York, have been appointed sales agents for the United States.

Recovery Labor Provisions Under Cross Fire

Manufacturers Criticize Organized Labor Proselyting; Union Labor Protests Gen. Johnson's Stand on Collective Bargaining

By L. W. MOFFETT

Resident Washington Editor, The Iron Age

WASHINGTON, June 27. — With the first hearing on a code of fair competition begun today, the National Recovery Administration is finding that the principal sources of complaints it is receiving are the labor provisions of the law under which it is operating.

Organized labor is protesting against the interpretation by General Hugh S. Johnson. Industrialists are complaining that the provisions are being used intensively by organized labor to unionize industry throughout. Industrialists also are complaining against the administrator's dictum that wages be raised immediately and that price increases be deferred.

The initial hearing concerns the code of the Cotton Textile Industry. Assisting General Johnson in conducting the hearing is Deputy Administrator W. L. Allen, former chairman of the Sheffield Steel Corp., and former director of the American Rolling Mill Co.

While Mr. Allen had been referred to as the "steel coordinator," and is in contact with units of the iron and steel industry, General Johnson has laid down the rule that no deputy administrator will be assigned to preside over a particular industry and none will participate in the hearing on a code of any industry in which he has any interest. Though Mr. Allen is entirely divested of any interests in the iron and steel industry, and has given up his clientele as consulting engineer, he will not preside over the hearing on any code coming from the steel industry. It is not likely that he will even pass upon the steel codes in any advisory capacity, as at first was thought he would.

Textile Code is First To Be Heard

The textile code hearing has attracted wide interest because being the first it is expected to establish precedents covering problems to govern codes. Sitting at the hearing with the Administrator and his Deputy Administrator are the Industrial, Labor and Consumers' Advisory Boards.

The labor provisions especially are receiving much attention. Organized labor has complained against the

Textile code providing for \$10 a week in the southern section and \$11 a week in the northern section with a 40-hr. week. It insists the wages should be higher and fears 40-hr. will be set generally as the work-week.

The drive of organized labor against General Johnson's interpretation of the labor provisions however was begun last Thursday by John L. Lewis, president of the United Mine Workers of America. Appearing before the first meeting of the Labor Advisory Board, presided over by Secretary of Labor Perkins, Mr. Lewis strongly protested against the following provision carried in the National Recovery Administration's bulletin on "Basic Codes of Fair Competition."

"Basic codes containing provisions respecting maximum hours of labor, minimum rates of pay and conditions of employment, which are in themselves satisfactory, will be subject to approval, although such conditions

?

"THE employer is as free to make non-membership in a union a condition of employment as the working man is free to join the union. This is part of the constitutional rights of personal liberty and private property not to be taken away even by legislation. . . . The same liberty which enables men to form unions, and through the unions to enter into agreement with employers willing to agree, enables other men to remain independent of the union and other employers to agree with them to employ no man who owes allegiance or obligation to the union."

From decision of the U. S. Supreme Court, Dec. 10, 1917, in the Hitchman Coal & Coke Case.

may not have been arrived at by collective bargaining."

Labor Leaders Want a Hand in Code Making

Speaking through Mr. Lewis, organized labor asked that it be consulted before industry presents codes. Industrialists have cited this as further evidence of efforts of organized labor to unionize industry.

General Johnson, however, has said repeatedly and claims the American Federation of Labor agrees with him, that the National Recovery Administration is not to be used for unionizing any industry.

"If the men organize, that is all right," declared General Johnson. "My job is to sit here in an impartial way. I have no initiative in this thing. This law has given men the right to bargain collectively. There is no argument. I have a law to execute and I am going to execute it."

There are some prominent basic industries, however, operating under working conditions both as to hours of labor and rates of pay which come well within requirements on this score which no doubt will file codes but will do so reluctantly because of their concern over the activities of organized labor under provisions of the National Recovery act.

Perkins Cannot "See" New Company Unions

Further concern has been shown also over the labor situation by reason of the position taken by Secretary Perkins' attitude toward newly formed company unions. In an interview last week she declared that she "imagined" company unions "hastily thought up" since the passage of the National Recovery bill "would not be regarded as truly representative." Miss Perkins qualified her position somewhat by saying that she felt individual cases would be considered as they are presented and that there might be exceptions to any opinion she expressed.

Her statements were made after presiding over the first meeting of the Labor Advisory Board and hearing Mr. Lewis' protest. Interestingly enough, Mr. Lewis was made a member of the Board immediately after the hearing.

What Will Industry Use For Wage Money?

Many industrialists in complaining against the Administration declaration that wages should be raised at once and price increases deferred insist that higher prices are imperative if wages go up. Many industries still are in the red and are unable to see how they can overcome the lag between a wage and a price increase. They have been left uncertain because of this policy as to what prices

to quote on new business. Some instead of quoting on a quarterly basis are considering quoting on a monthly basis until the difficulty has been solved. Others have already boosted prices much to the ire of General Johnson.

Large Corps of Publicity Men

It is certain that no government setup in peace time has ever exceeded, if it has equaled, the National Recovery Administration's publicity drive. It has a large corps in its press bureau. It is a busy mill, working long hours of the day and often into the night turning out volumes of press material, including General Johnson's statements made at semi-weekly conferences with correspondents, rules and regulations, statements regarding code, addresses by members of the organization, etc. Also the radio is being used widely to sell the National Recovery Administration to the public. With public support, General Johnson is confident the "government-business" partnership will "go over." Without it he does not think it will succeed.

The administration, General Johnson says, is being organized as one would organize an industry and with the public vitally concerned it is proposed to let the public know of what has been done and is contemplated. There are complaints, however, that either through confusion still existing over setting up such an organization, which has no precedent in all history, or because they are crowded for time, officials of the administration have not as yet made many things clear which are of interest.

Dilemma of the Diversified Product Company

One question that has been asked concerns the position of companies which manufacture a diversity of products and are eligible to membership in numerous trade associations, each of which will have its own code. There is uncertainty as to which code such a company will operate under.

No definite answer has been made to this. It has been said, however, by General Johnson that it is desirable that as large a group of products as possible be included in a single code. This is for the purpose of convenience and expediting hearings and practices. It is being insisted upon, however. In steel, for example, the basic code of the American Iron and Steel Institute could be supplemented by individual codes for various units such as flat rolled products and possibly other lines.

What is Average Cost?

General Johnson has stated that no general ruling has been laid down regarding price fixing. Prices do not have to be put into codes, but it will be proper, he pointed out, to have a provision that those submitting codes

are not going to sell products at less than the cost of production. The question has been raised as to the manner in which the cost for an industry will be determined. There has been no set plan, though it was stated the trend is toward a system of uniform cost accounting. Some companies by virtue of low overhead have been able to make a profit even at the low prices that have prevailed throughout the depression. Assuming that such companies have been paying fair wages, it has been asked how can a charge be made that they are selling below cost. It has been declared that no such charge can be made. Such companies simply would realize greater net profits than those whose costs are higher.

No method has been devised to determine whether prices are too low or too high in industries which do not produce a standard product but build equipment to order.

A Temporary Halt on Production Improvement

Again, the point has been made that if prices are fixed, manufacturers have only two ways in which to increase their profits: Through increased volume and through lower costs. Since wages will be fixed, there will be no opportunity for lower costs through cuts in labor rates. Inasmuch as the object of the act is to increase employment, it has been asked whether a manufacturer is at liberty to introduce labor saving machinery which, through lower costs, displaces workmen?

General Johnson's position on this point, and it has been the object of criticism, appears to be toward discouraging further use of labor saving devices. He made this declaration in connection with his statement that he is giving to ask "something in the nature of an armistice on increased producing capacity, until we see if we can get this upward spiral (purchasing power) started."

He said that no hard and fast rule can be made but added that "We are going to plead very earnestly with these industries not to use any further labor saving devices or anything to further increase production."

Sponsors of the act have declared that it not only would increase competition but that it also would encourage research, invention and technological development generally. General Johnson's position appears to be directly in conflict with this view, though he indicated plainly that he would seek only a temporary halt in withholding further use of labor saving devices. But even so, it has been urged it is an encouraging prospect for replacing obsolete equipment with modern metal-working machinery and other improved units of production and it is this very field which is a prospective source of large buying and therefore of increased em-

ployment and wages, all of which would evidently aid in lifting purchasing power.

Production Still Ahead of Purchasing Power

The National Recovery administration is not only disturbed over reports of price advances but also because the production curve again is rising faster than the purchasing power curve. Senator King, of Utah, has denounced what he terms widespread profiteering on the part of many producers which it is claimed have taken advantage of the upturn in business and growing public confidence. The Utah Senator said he would ask that the Department of Justice make an investigation of alleged profiteering. This situation is attributed to a speeding up of production and accumulation of large stocks of materials before wages are raised and hours of labor curtailed under the new law. These stocks, it is charged, are being offered at price increases ranging from 20 to 40 per cent.

General Johnson has been urged to curtail production in order to stop this rapid rise in production, said to affect many commodities. Basic industries apparently are not included in the list said to be taking advantage of the new act to hike prices, and speeding up production in order to build up stocks. Because of the growing disparity between the production and purchasing power curves, General Johnson is especially eager to bring the purchasing power up to a level with the production line. Hence his proposed "armistice" on increased capacity and his appeal for quick submission of basic codes raising wages and shortening hours of labor. Deferring price increases is another fundamental objective of General Johnson and presentation of codes at an early date, it is believed, will check the move toward higher prices which has disturbed the National Recovery Administration. It has not laid down a general rule on price fixing, except to provide that producers can say in codes that they will not sell below cost.

"When they go beyond that in price fixing I would have to step in because that leads to monopoly—and prevention of that is part of what the Administration is here for," said General Johnson. "It is not here to institute the organization and operation of these industries. We are here for the purpose of seeing that what they propose to do does not bear unfairly upon the public. That is where the Consumers' Advisory Committee comes in."

The price question has developed so many angles that it is believed it will be taken up by the entire Industrial Advisory Board of which Secretary of Commerce Daniel C. Roper is chairman, before a definite policy is determined.

The question of dealing with those

who have taken contracts at increased prices also is a difficult one. General Johnson has stated that appeal might be made to adjust them. He does not think the National Recovery act gives power to order changes in contracts.

He made his attitude on these points known when he was asked about the contract situation.

"If trade practices adopted are inconsistent with the terms of contracts now in existence, what becomes of the contracts?" General Johnson was asked.

"Your question applies to sales agreements?"

"Well, yes."

"You know, the Federal government can pass laws to alter sales agreements but I don't think this law intended to do that. We are going to ask for cooperation to make this law work and if necessary we are going to ask the people to relax the terms of the contracts."

The second code to be submitted was that by the cast iron soil pipe manufacturers, representing 95 per cent of their industry. The proposed code fixes a maximum 30-hr. week with minimum wages of \$2.75 a day in Southern plants and \$4.25 a day elsewhere. At present wages in Southern cast iron soil pipe plants range from \$1.25 to \$1.85 and in Northern plants from \$2.50 to \$3 a day.

The Cast Iron Soil Pipe Association, in its application for approval of the code, says that under normal conditions approximately 12,000 persons are employed in the industry. Only 3500 are now engaged, but it is anticipated that approval of the code will permit almost immediate reemployment of another 2500 men.

General Johnson stated that inasmuch as the soil pipe industry is relatively small it is improbable that its code will be considered until disposition has been made of codes to be filed by major industries.

Malleable Tonnage Up in May

WASHINGTON, June 27. — Rising 6815 tons, bookings of malleable castings in May totaled 24,671 tons against 17,856 in April, according to reports received by the Bureau of the Census from 112 establishments. In the first five months of 1933 orders aggregated 78,388 tons compared with 87,023 tons in the corresponding period of last year.

Production in May rose to 24,628 tons from 17,871 tons in April and in the first five months of the present year amounted to 78,407 tons against 90,135 tons in the corresponding period of last year.

British Markets More Active, Sheet Prices Up

LONDON, ENGLAND, June 27 (By Cable).—The British iron and steel markets are more active this week, with pig iron consumers buying in expectation of a price advance. Rails and ship steel are still slow, but the demand for merchant bars is expanding and the virtual cessation of Continental steel imports has diverted some orders to British mills.

Tin-plates are quiet with output at about 55 per cent of capacity. The basis for galvanized sheets has been raised ten shillings for all markets except India and Scandinavia, and black sheets, on 24 gage basis have been advanced a similar amount.

Continental business is limited mostly to resales, the Continental market being influenced by the cartel deliberations. Business being done is

at slightly under the cartel prices.

It is expected that the new C. I. F. cartel prices will be announced this week. The Continental wire rod cartel left prices and third quarter quotations unchanged.

Broken Hill Proprietary Co. and Stewarts and Lloyds have formed Buttwell Proprietary, Ltd., to manufacture steel tubes and pipes at Newcastle, Australia.

Postpones Destroyer Bids Until July 26

WASHINGTON, June 27. — Acting Secretary of the Navy Henry L. Roosevelt last week announced that the date for opening of bids for the construction of four destroyers previously set for July 6 had been postponed to July 26, the time fixed for opening bids for 16 of the 32 vessels which are to be constructed under the National Recovery act and one heavy cruiser. The heavy cruiser, in compliance with the terms of the London Naval treaty, will not be laid down until after Jan. 1, 1934. All the 17 vessels authorized under the National Recovery act will be built in private yards. They are two aircraft carriers, 20,000 tons each; one heavy cruiser, 10,000 tons; one light cruiser, 10,000 tons; four destroyers, 1850 tons each; seven destroyers, 1500 tons each; two submarines, 1400 tons each.

Acting Secretary Roosevelt also announced that the construction of two submarines of 1500 tons displacement each of the new building program has been allocated to the Portsmouth, N. H., navy yard and one of the two gunboats of 2000 tons each will be constructed at the Charleston, S. C., navy yard and the other at the New York navy yard.

May Reached 12.9 Per Cent of Steel Casting Capacity

WASHINGTON, June 27.—Orders for commercial steel castings rose to 20,755 tons or 14.1 per cent of the capacity of 128 establishments reporting to the Bureau of the Census, from 14,507 tons or 9.9 per cent of capacity in April. In the first five months of 1933 bookings totaled 71,519 tons compared with 73,866 tons in 1932.

Production in May amounted to 18,991 tons or 12.9 per cent of capacity against 12,071 tons or 8.2 per cent of capacity in April. In the first five months of the current year production totaled 70,660 tons compared with 88,276 tons in the corresponding period of last year.

British Prices f.o.b. United Kingdom Ports

Per Gross Ton			
Ferromanganese, export	\$9		
Billets, open-hearth \$5		to \$5 7s. 6d.	
Black sheets, Japanese specifications	\$11		
Tin plate, per base box	17s. 3d.	to 17s. 6d.	
Steel bars, open-hearth	\$7 17½s.	to \$8 7½s.	
Beams, open-hrth. \$7 7½s.		to \$7 17½s.	
Channels, open-hearth	\$7 12½s.	to \$8 2½s.	
Angles, open-hearth	\$7 7½s.	to \$7 17½s.	
Black sheets, No. 24 gage	\$9		
Galvanized sheets, No. 24 gage	\$11	to \$11 10s.	

Continental Prices f.o.b. Continental Ports

Per Metric Ton, Gold £ at \$4.86	
*Ingots	\$2 5s.
*Billets, Thomas	\$2 7s.
Wire rods, No. 5 B.W.G.	\$4 10s.
Black sheets, No. 31 gage, Japanese	\$11 5s.
*Steel bars, merchant	\$3
*Sheet bars	\$2 8s.
Plates, ¼ in. and up	\$3 18s. 6d.
*Plates, ½ in. and 5 mm.	\$4 1s.
*Sheets, ¼ in.	\$4 6s.
*Ship plates	\$4 10s.
*Beams, Thomas	\$2 10s. 6d.
*Angles (basis)	\$3
Hoops and strip steel over 6-in. base	\$3 12s. 6d.
Wire, plain, No. 8	\$5 7s. 6d.
Wire nails	\$5 15s.
Wire, barbed, 4-pt. No. 10 B.W.G.	\$8 15s.

*Prices as established by European Raw Steel Cartel.

PERSONALS

FRED O. SMITH, executive vice-president of the Vulcan Iron Works, Wilkes-Barre, Pa., in addition to his other duties, has taken charge of the sales of the company. Mr. Smith has been associated with the Vulcan Iron Works for over 40 years, is a director of the company, and has a wide acquaintance in the iron and steel industry and in the anthracite coal region. Mr. Smith is also president of the Wilkes-Barre Iron Mfg. Co., of Wilkes-Barre, a director of the First National Bank of the same city, and a member of the American Iron and Steel Institute.

H. B. MILLER, formerly Eastern manager for the Colorado Fuel & Iron Products Co. and in charge of sales in Kansas, Nebraska and South Dakota, has been transferred to the San Francisco office, where he will assume the duties of district manager. He succeeds C. H. MACDONALD, who early this year was made vice-president in charge of steel and wire sales with offices in Denver. Mr. Miller has been identified with the steel and wire sales department of the Colorado Fuel & Iron Co. or its subsidiaries for the past 18 years.

FRED M. ZEDER, vice-president in charge of engineering of the Chrysler Corp., has been awarded the degree of master of engineering by the University of Michigan for "his encouragement of fundamental research in automotive engineering."

JOHN F. TINSLEY, vice-president and general manager of the Crompton & Knowles Loom Works, Worcester, Mass., has been made a director of the New England Telephone & Telegraph Co. Mr. Tinsley went with the American Steel & Wire Co.,

Worcester, in 1905, and subsequently became general superintendent of the South Works, a position he relinquished to associate with the loom works.

CHARLES PAGE PERIN, of the Perin Engineering Co., New York, was given the honorary degree of doctor of engineering by Rensselaer Polytechnic on June 17.

OBITUARY

T. COLEMAN WARD, president of Hickman, Williams & Co., Pittsburgh, died at his home in that city on June 26. He was born in Louisville, Ky.,



T. COLEMAN WARD

and early in his career was identified with the operating end of the pig iron industry in Birmingham. Mr. Ward went to Pittsburgh in 1903 to become associated with Hickman, Williams & Co., of which he was president for many years.



NORMAN W. STORER, consulting engineer for the Westinghouse Electric & Mfg. Co., East Pittsburgh, recently received the Lamme Medal for outstanding contributions to the electrical industry. The medal is awarded annually by the Ohio State University, Columbus, and Mr. Storer received it for his work on electrical street railroad apparatus. At the left Dr. S. M. Kintner, vice-president in charge of engineering for the Westinghouse company, is shown congratulating Mr. Storer.

FRANK NORMAN MACLEOD, president of the Abrasive Machine Tool Co., Providence, died on June 25 at his summer home in Harwichport, Mass. Mr. MacLeod began his career as an apprentice with the George H. Corliss Steam Engine Works, Providence, and later became assistant sales manager for the Brown & Sharpe Co. In 1917 he founded the company of which he was president. He was a past vice-president and director of the National Machine Tool Builders' Association.

ROBERT L. KIFT, treasurer and one of the founders of the Lehigh Structural Steel Co., Allentown, Pa., died at his home in Bethlehem, Pa., after a brief illness on June 25. He had been a resident of the Lehigh Valley for 21 years and during that time had been identified with a number of construction companies. He was 48 years old.

JAMES R. MCWANE, president of the McWane Cast Iron Pipe Co., Birmingham, and the Pacific States Cast Iron Pipe Co., Provo, Utah, died in Chicago on June 24, after a week's illness. Mr. McWane organized the McWane Cast Iron Pipe Co. in 1922 after having served as vice-president and president of the American Cast Iron Pipe Co., Birmingham, since 1907.

L. G. ALDRICH, who had been in charge for the past five years of the Chicago office of the Landis Tool Co., Waynesboro, Pa., died on June 10, aged 40 years. He had previously been connected with the International Harvester Co.

Andrews Interests Effect 10 Per Cent Wage Rise

A 10 per cent increase in the wages and salaries of all employees of steel mills of the Andrews interests in Newport, Ky., to be effective July 1, was announced the past week. The companies affected by the announcement are the Andrews Steel Co., The Newport Rolling Mill Co., the Globe Iron Roofing & Corrugating Co., and the Newport Culvert Co.

Air Conditioning Gets Unusual Job

Air conditioning equipment to eliminate odors from refuse awaiting the city collector, is the oddest job yet given to the new Westinghouse units, but an installation for that purpose has been made in the Shoreham Hotel in Washington. Contract for the equipment was placed with Wm. E. Kingwell, Inc., Westinghouse dealer in the capital.

OFF THE ASSEMBLY LINE



Motor Car Output Reaches New Peak; June Total Will Be 240,000 Cars

DETROIT, June 27.

LIMITED solely by its ability to get raw materials and parts in sufficient volume, the automobile industry the past week pushed up production to the highest point since early in June, 1931. This further spurt in manufacture was caused by the prodding of sales departments which are apprehensive because deliveries are becoming longer delayed as assemblies continue to lag behind retail sales. It now becomes apparent that total output this month will be at least 240,000 units and that June will surpass May for the first time in 11 years. July still promises to be an exceptionally good month, although not equaling June. Schedules for next month will depend largely on the sales trend during the next two weeks.

Not for two years have motor car companies brought such terrific pressure to bear on suppliers seeking deliveries of materials. The truth is that no one outside the industry underestimated the demand for cars more than the automobile executives themselves, the result being that in April and May and even in the early part of June materials orders just barely covered requirements. The recent intensification of operations caught suppliers at least partially unprepared and mostly depleted whatever stocks of finished materials and parts were on hand. This has precipitated a rush of manufacturing activities involving night shifts in many cases and the running of plants six and seven days a week.

Chevrolet has further increased its operations and its June assemblies are now estimated at 80,000 units. Pontiac, with 12,500 cars planned for this month, will pare down its output to 11,000 units next month. Making 5000 cars in June, Buick is likely to hold close to that mark in July. Oldsmobile and Cadillac-LaSalle, with 4500 and 1000 units respectively during the current months, have not yet set their July goal. This means that

General Motors will assemble nearly 100,000 units in June and at least 80,000 to 85,000 units in July.

Domestic sales of passenger cars and trucks in May are estimated at 186,000 units, compared with 148,583 in the same month of 1932 according to R. L. Polk & Co. Retail sales in June are expected to be well over the two hundred thousand mark.

Sales Exceed Production Rate

Plymouth continues to break records. During the week ended June 10, sales to consumers amounted to 6291 cars and factory shipments were 8561 cars. The factory is making about 1500 cars a day, six days a week, and this month should assemble 37,000 units. On Saturday Plymouth had sold its entire June output of cars and orders received since then are to be carried over into July. Dodge is producing 12,000 cars this month and will have a like schedule next month. Retail sales of De Soto cars have increased to such an extent that the factory yesterday stepped up operations to 200 cars a day. To summarize the Chrysler situation: the corporation will show a production of about 56,000 cars this month and is planning on about the same volume for July.

The Atlantic seaboard still is the most active market for cars although a pickup is reported in the manufacturing areas of the Middle West, in the Mountain States and on the Pacific Coast. Sales executives are looking for a steadily increasing demand from agricultural sections and from the southern cotton belt.

Ford is reported to be expanding its activities, with total assemblies well over 2000 units a day five days a week. It is a striking fact that after losing over \$128,000,000 in two years, Ford was still able to maintain a cash position above \$300,000,000. It is pointed out that Ford could have cut losses considerably last year if he had operated with economy as his sole

aim. As it was, he employed many thousands who were not actually needed and continued to maintain wages at a minimum of \$4 a day, the highest rate in the industry.

Employment Doubled in Detroit

The extent of reemployment in Detroit was revealed in a statement the past week by Chester M. Culver, general manager of the Employers' Association of Detroit. He said that the low mark was hit in January of this year when 97,000 men were at work. The upswing since then has been gradual, with total employment today at 183,000. Mr. Culver is of the opinion that this will increase to 200,000 by the end of August, or more than were employed on the same date in 1932, 1931 and 1930.

American Federation of Labor is preparing to launch an active drive for unionization of the automobile industry and to this end has sent to this city two of its headquarters staff to direct the campaign. The Federation movement is entirely apart from the recently revived activities of the communistic tinged auto workers union.

Early impressions that the automobile industry will move slowly in bringing itself under the Industrial Recovery Act were confirmed the past week when at a meeting here of the National Automobile Chamber of Commerce a sub-committee with Donaldson Brown of General Motors as chairman began a survey of factory and sales practices, including wages and conditions of employment. The sub-committee will report direct to the board of directors early in July. The industry is presenting a united front in formulating a program to present to General Johnson, the Ford Motor Co., which is not a member of the chamber, being represented on the sub-committee. There was agreement at the meeting that the industry, by closely adjusting production to retail demand and by eliminating wasteful sales methods, has of its own volition

approached close to the ideal which the Recovery Act contemplates. It is said that if a 30-hr. week were applied to the industry, it would be necessary to employ 20 per cent more men with production at its present level. The average pay in the industry is about 60c. an hour; for a 30-hr. week then, an employee would get

\$18. Manufacturers believe that little readjustment would be necessary to conform to the Industrial Recovery Act.

Parts makers have a more difficult task ahead of them, for their wages are reported to be lower and hours less steady than in the automobile factories.

Fabricated Structural Steel

Awards Decline—New Projects Gain Slightly

LETTINGS of 15,500 tons, although in fair volume, are less than those of a week ago when 22,800 tons were reported. Two awards, one of 4500 tons for a Pennsylvania Railroad pier at Baltimore and another of 5500 tons for a court house at Kansas City, Mo., account for more than one half of this week's total. New projects of 7225 tons compare with 7000 tons in the previous week and 3055 tons two weeks ago. The largest inquiry reported is 900 tons for two bridges at Fargo, N. D. Plate awards total 4220 tons. Structural steel lettings for the week follow:

NORTH ATLANTIC STATES

Bethel, Me., 135 tons, Gould Academy, to New England Structural Steel Co.

Boston, 200 tons, Hyde Park district school, to New England Structural Co.

Hyde Park, N. Y., 225 tons, William Barton Rogers School, to New England Structural Co.

New York, 180 tons, Ohrback's Store, to National Bridge Works.

Philadelphia, 130 tons, building for American Commercial Alcohol Corp., to Morris Wheeler & Co.

Philadelphia, 100 tons, Publicker Commercial Alcohol Co., to McClintic-Marshall Corp.

Lycoming County, Pa., 600 tons, highway bridge, to Lackawanna Steel Construction Corp.

Jeddo, Pa., 150 tons, power house for Jeddo-Highland Coal Co., to Shoemaker Bridge Co.

Baltimore, 1150 tons, University Hospital, to Dietrich Brothers.

Baltimore, 4500 tons, Pennsylvania Railroad pier, to McClintic-Marshall Corp.

Baltimore, 175 tons, bottling house for National Brewing Co., to Maryland Steel Products Co.

THE SOUTH

State of Virginia, 310 tons, arch centering for bridge over James River to Blaw-Knox Co.

Huntington, W. Va., 200 tons, building for Owens-Illinois Glass Co., to Fort Pitt Bridge Works Co.

Lanett, Ala., 100 tons, bleachery, to Virginia Bridge & Iron Co.

CENTRAL STATES

Milwaukee, 500 tons, Blatz Brewing Co., to Milwaukee Bridge Co.

Milwaukee Road, 200 tons, bridge at Golf, Ill., to Wisconsin Bridge & Iron Co.

Lead, S. Dak., 700 tons, buildings and equipment for Homestake Mining Co., to Worden-Allen Co.

Kansas City, Mo., 5500 tons, court house, to Kansas City Structural Steel Co.

WESTERN STATES

Griffith Park, Cal., 235 tons, planetarium building, to Pacific Iron & Steel Co., Inc.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Burlington, Vt., 250 tons, Y. M. C. A. building.

Sandy Hook, Conn., 500 tons, bridge over Housatonic River.

Long Island City, N. Y., 550 tons, building for Burke Brewery.

New York, 200 tons, refrigerator building on Washington Street; bids to be opened in July.

New York, 200 tons, Frick museum and library; bids to be taken in July.

Brunswick, Md., 200 tons, bridge over Catoctin Creek.

New York, unstated tonnage, three-story planetarium; Reconstruction Finance Corp. loan of \$650,000 granted American Museum of Natural History.

THE SOUTH

New Bern, N. C., 175 tons, post office and courthouse.

CENTRAL STATES

Marion, Ind., 250 tons, power house; O. A. Hooker Co., Madison, Wis., low bidder on general contract.

Cleveland, 500 tons, garbage incinerator; bids July 13.

Fargo, N. D., 900 tons, two bridges

WESTERN STATES

Loveland, Colo., 200 tons, State highway bridge.

State of Colorado, 269 tons, highway bridges in four counties; bids under advisement.

Culbertson, Mont., 900 tons, highway bridge.

Oakland, Cal., 110 tons of sheets, Key System terminal; bids under advisement.

State of Oregon, 122 tons, highway bridges in Linn and Polk counties; bids under advisement.

Marion County, Ore., 155 tons, United States Bureau of Public Roads bridge; bids July 7.

Seattle, 3561 tons of sheet piling, Railway Avenue seawall; no bids received.

Marshfield, Ore., 100 tons, post office; bids July 12.

Los Angeles Bureau of Water and Power, 30,000 tons, steel tower transmission line to Boulder Dam; bids July 14. Previously reported as 28,000 tons.

Los Angeles, 20,000 tons for Metropolitan Water District; bids being prepared.

FABRICATED PLATE

AWARDS

Bolivar, N. Y., 250 tons, tanks for Leader Industries, to Hammond Boiler Co.

Brooklyn, 220 tons, fuel tank for Paragon Oil Co., to Hammond Iron Works.

River Rouge, Mich., 1900 tons, tanks for Texas Corp., to McClintic-Marshall Corp.

Corpus Christi, Tex., 950 tons, pipe for Southern Alkali Corp., Barborton, Ohio, subsidiary Columbia Chemical Co., to Youngstown Sheet & Tube Co.

Corpus Christi, Tex., 900 tons, tanks for Southern Alkali Corp., to an unnamed fabricator.

NEW PROJECTS

Gallion, Ohio, 100 tons, 400,000-gal. municipal tank.

Engineering Week Opens With Surprising Attendance

CHICAGO, June 27.—The eleven or more engineering societies all meeting here in the shadow of the Century of Progress exhibition comprised an attendance which has surpassed expectations. The testing materials society's registration is within ten per cent of that for the same period of its meeting two years ago held also in Chicago. The close attention paid to technical sessions is a surprise and engineers' week will probably be voted a huge success.

Some history in the field of metal cutting was written Monday in a paper by Friedrich Schwerd, Hanover, Germany, read before the Mechanical Engineers. Marked progress was made in the joint activity of the Mechanical and Testing Engineers to solve the problems of metals for high temperature and high pressure service, the week's contribution being the adoption of two codes for conducting tests of the materials. The joint work of the Testing Engineers and the American Foundrymen's Association in drawing up a manual on cast iron produced a monumental compilation which is likely to be generally

available before the end of the year. It will prove to be a guide and text book for the user as well as maker of iron castings. It covers such matters as wear resistance, corrosion, heat resistance, heat treatment and welding and is calculated to give the last word on commercially practical alloy castings.

Cast Iron Pipe

Muskogee, Okla., has plans for pipe lines for water and sewer mains. Fund of \$60,000 is being arranged.

Beaumont, Tex., plans 12 and 16-in. water lines in connection with waterworks improvement program. Cost about \$300,000. S. W. Freese, Fort Worth, Tex., is engineer.

Lakemore, Ohio, plans installation of about 30,000 ft. of 6 to 12-in. for water service. Fund of \$90,000 is being arranged for water system expansion. Paul W. Elwell, Inc., 4300 Euclid Avenue, Cleveland, is engineer.

Ann Arbor, Mich., has awarded 400 tons of 6, 8 and 12-in. to American Cast Iron Pipe Co.

Milwaukee takes bids June 29 on 500 tons of pipe and fittings for sewage plant addition.

Board of Public Works, Los Angeles, plans call for bids for water system, Allysmae and Erwin Street districts, including 4965 ft. of 6 and 8-in.

Seattle failed to receive bids on Railway Avenue seawall which called for 770 tons.

SUMMARY OF THIS WEEK'S BUSINESS

Pressure for Steel Drives Output to 53 Per Cent of Capacity

Sharp Gains Made at Chicago, Pittsburgh, Cleveland and in Eastern Pennsylvania—Prices for Forward Delivery Still Undetermined

STEEL production has made another three-point gain, advancing from 50 to 53 per cent of capacity. The upward swing of output, which has been uninterrupted since operations struck a low of 14 per cent the third week in March, has marked one of the sharpest recoveries in the history of the trade.

The expansion of production has been closely paralleled by a comparable growth of consumption, especially on the part of automobile makers and other industries making consumer goods. It has been largely from tin plate, bars, sheets, strip and other light rolled products that the steel industry has obtained the tonnage which has made heavier operations possible. Business from the construction industry and from the railroads has been insignificant throughout the period under review, and it is now a question how much further steel output can increase without such support. Steel needed for the Government's public works program cannot reach steel mills before autumn, and no material enlargement of railroad purchases is in early prospect.

SO far as the steel industry is concerned, the first phase of recovery appears to be over. This view is supported by the fact that latterly, at any rate, many buyers have been taking steel in excess of their known requirements. Specifications against second quarter contracts have been unusually heavy. Buyers have been influenced to order out steel not merely on account of prospective price advances but because of continued uncertainty as to when producers will again make firm quotations.

In some cases mills are accepting business at current prices for July shipment but others are taking forward business only with a saving clause protecting them against increases in costs. Buyers are ordinarily reluctant to place orders for future delivery subject to price revision and, since many of them have taken full advantage of expiring contracts, new business of the mills in the coming month may suffer.

Such a recession may not be enough to affect production, since steel makers will be delivering against current specifications for several weeks to come. Moreover, the momentum that has been built up in certain consuming lines cannot be overlooked. The automobile industry, which has consistently underestimated the strength of demand, now finds its operations at the highest point since June, 1931. Output for this month will total at least 240,000 cars and will surpass that of May for the first time in 11 years. Retail sales

in June also have shown a substantial gain, foreshadowing a continuance of a high operating rate in July.

INCREASES in steel output in the various producing centers are still impressive. At Chicago operations rose from 50 to 55 per cent, at Pittsburgh from 40 to 45 per cent, in the Cleveland-Lorain area from 67 to 71 per cent, in eastern Pennsylvania from 26 to 36 per cent, and in the South from 50 to 54 per cent. That the steel industry believes further substantial gains are assured is indicated by the firing of additional blast furnaces at Chicago, Braddock and Johnstown, Pa., and Birmingham.

The rehabilitation of idle blast furnaces and open-hearths is expensive and accounts, in part, for producers' uncertainty as to their future costs. Another factor is a rise in fuel costs, growing out of labor troubles in the Connellsville region. By-product coking coal is growing scarce, and furnace coke has advanced from \$1.75 to \$2, Connellsville, with further increases in prospect. The greatest uncertainty is the extent of wage advances that will be made with the adoption of a code by the industry under the national recovery act. According to varying estimates, a 10 per cent increase in wage rates would raise costs \$2 to \$5 a ton.

PIG IRON producers have withdrawn third quarter quotations and are now taking business for July shipment only. Structural steel awards, at 15,500 tons, compare with 22,800 tons a week ago. Formal allotment of \$400,000,000 for road construction has been made to the States by the new Public Works Administration.

An advance in scrap at Chicago has raised THE IRON AGE composite price for heavy melting steel from \$9.96 to \$10.08 a gross ton. Although action on most steel products has been suspended, tin mill black plate has gone up \$4 a ton to 2.50c. a lb., Pittsburgh, while large rivets have been raised \$5 a ton to \$2.50 per 100 lb. The disappearance of concessions on plates, long the weakest of heavy rolled products, has caused THE IRON AGE composite price of finished steel to advance from 1.892c. to 1.904c. a lb. The high for this year, 1.948c., was reached early in January. Although higher prices on pig iron are imminent, THE IRON AGE composite remains at \$15.01 a gross ton, unchanged since late in May.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron	June 27, 1933	June 20, 1933	May 29, 1933	June 28, 1932
<i>Per Gross Ton:</i>				
No. 2 fdy., Philadelphia.....	\$16.34	\$16.34	\$16.34	\$14.84
No. 2, Valley furnace.....	15.50	15.50	15.50	14.50
No. 2 Southern, Cin'ti.....	16.51	16.51	16.51	13.82
No. 2, Birmingham.....	12.00	12.00	12.00	11.00
No. 2 foundry, Chicago*.....	16.00	16.00	16.00	16.00
Basic, del'd eastern Pa.....	16.09	16.09	16.09	16.00
Basic, Valley furnace.....	15.00	15.00	15.00	14.00
Valley Bessemer, del'd P'gh..	17.89	17.89	17.89	16.89
Malleable, Chicago*.....	16.00	16.00	16.00	16.00
Malleable, Valley.....	15.50	15.50	15.50	15.00
L. S. charcoal, Chicago.....	23.17	23.17	23.17	23.17
Ferromanganese, seab'd car-				
lots	68.00	68.00	68.00	68.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Rails, Billets, etc.

<i>Per Gross Ton:</i>				
Rails, heavy, at mill.....	\$40.00	\$40.00	\$40.00	\$43.00
Light rails at mill.....	30.00	30.00	30.00	32.00
Rerolling billets, Pittsburgh..	26.00	26.00	26.00	26.00
Sheet bars, Pittsburgh.....	26.00	26.00	26.00	26.00
Slabs, Pittsburgh.....	26.00	26.00	26.00	26.00
Forging billets, Pittsburgh...	31.00	31.00	31.00	33.00
Wire rods, Pittsburgh.....	35.00	35.00	35.00	37.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb..	1.60	1.60	1.60	1.60

Finished Steel

<i>Per Lb. to Large Buyers</i>	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.60	1.60	1.60	1.60
Bars, Chicago.....	1.70	1.70	1.70	1.70
Bars, Cleveland.....	1.65	1.65	1.65	1.65
Bars, New York.....	1.95	1.95	1.95	1.95
Tank plates, Pittsburgh.....	1.60	1.50	1.50	1.60
Tank plates, Chicago.....	1.70	1.70	1.70	1.70
Tank plates, New York.....	1.598	1.598	1.598	1.898
Structural shapes, Pittsburgh.	1.60	1.60	1.60	1.60
Structural shapes, Chicago...	1.70	1.70	1.70	1.70
Structural shapes, New York.	1.86775	1.86775	1.86775	1.86775
Cold-finished bars, Pittsburgh	1.70	1.70	1.70	1.70
Hot-rolled strips, Pittsburgh..	1.55	1.55	1.55	1.45
Cold-rolled strips, Pittsburgh.	2.00	2.00	2.00	2.00

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel	June 27, 1933	June 20, 1933	May 29, 1933	June 28, 1932
<i>Per Lb. to Large Buyers</i>	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.10	2.10	2.10	2.20
Hot-rolled annealed sheets, No. 24, Chicago dist. mill..	2.20	2.20	2.20	2.30
Sheets, galv., No. 24, P'gh....	2.70	2.70	2.70	2.85
Sheets, galv., No. 24, Chicago dist. mill.....	2.80	2.80	2.80	2.95
Hot-rolled sheets, No. 10, P'gh	1.50	1.50	1.50	1.55
Hot-rolled sheets, No. 10, Chi-				
cago dist. mill.....	1.60	1.60	1.60	1.65
Wire nails, Pittsburgh.....	1.85	1.85	1.85	1.95
Wire nails, Chicago dist. mill	1.90	1.90	1.90	2.00
Plain wire, Pittsburgh.....	2.10	2.10	2.10	2.20
Plain wire, Chicago dist. mill.	2.15	2.15	2.15	2.25
Barbed wire, galv., Pittsburgh	2.35	2.35	2.35	2.60
Barbed wire, galv., Chicago				
dist. mill.....	2.40	2.40	2.40	2.65
Tin plate, 100 lb. box, P'gh...	\$4.25	\$4.25	\$4.25	\$4.75

Old Material

<i>Per Gross Ton:</i>				
Heavy melting steel, P'gh....	\$11.75	\$11.75	\$11.50	\$8.25
Heavy melting steel, Phila...	9.25	9.25	9.25	6.25
Heavy melting steel, Ch'go...	9.25	8.87 1/2	8.50	5.25
Carwheels, Chicago.....	9.50	9.50	9.50	5.50
Carwheels, Philadelphia.....	10.25	10.25	9.75	8.00
No. 1 cast, Pittsburgh.....	10.50	10.50	10.50	9.00
No. 1 cast, Philadelphia.....	10.25	10.25	10.25	8.00
No. 1 cast, Ch'go (net ton)...	8.75	8.75	8.75	6.00
No. 1 RR. wrot., Phila.....	10.75	10.75	10.75	8.50
No. 1 RR. wrot., Ch'go (net)..	6.50	6.50	6.50	3.75

Coke, Connellsville

<i>Per Net Ton at Oven:</i>				
Furnace coke, prompt.....	\$2.00	\$1.75	\$1.75	\$2.00
Foundry coke, prompt.....	2.75	2.50	2.50	3.00

Metals

<i>Per Lb. to Large Buyers</i>	Cents	Cents	Cents	Cents
Electrolytic copper, refinery..	7.75	7.75	7.25	5.12 1/2
Lake copper, New York.....	8.00	8.00	7.50	5.50
Tin (Straits), New York.....	40.00	44.95	39.25	19.12 1/2
Zinc, East St. Louis.....	4.35	4.35	4.20	2.75
Zinc, New York.....	4.72	4.72	4.57	3.12
Lead, St. Louis.....	4.05	4.05	3.75	2.90
Lead, New York.....	4.20	4.20	3.90	3.00
Antimony (Asiatic), N. Y....	6.50	6.50	6.25	5.12 1/2

▲▲▲ The Iron Age Composite Prices ▲▲▲

Finished Steel

June 27, 1933	1.904c. a Lb.
One week ago	1.892c.
One month ago	1.892c.
One year ago	1.976c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot rolled strip. These products make 85 per cent of the United States output.

	High	Low
1933	1.948c., Jan. 3;	1.867c., Apr. 18
1932	1.977c., Oct. 4;	1.926c., Feb. 2
1931	2.037c., Jan. 13;	1.945c., Dec. 29
1930	2.273c., Jan. 7;	2.018c., Dec. 9
1929	2.317c., April 2;	2.273c., Oct. 29
1928	2.286c., Dec. 11;	2.217c., July 17
1927	2.402c., Jan. 4;	2.212c., Nov. 1

Pig Iron

\$15.01 a Gross Ton
15.01
15.01
14.01

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

High	Low
\$15.01, May 29;	\$13.56, Jan. 3
14.81, Jan. 5;	13.56, Dec. 6
15.90, Jan. 6;	14.79, Dec. 15
18.21, Jan. 7;	15.90, Dec. 16
18.71, May 14;	18.21, Dec. 17
18.59, Nov. 27;	17.04, July 24
19.71, Jan. 4;	17.54, Nov. 1

Steel Scrap

\$10.08 a Gross Ton
9.96
9.75
6.58

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

High	Low
\$10.08, June 27;	\$6.75, Jan. 3
8.50, Jan. 12;	6.42, July 5
11.33, Jan. 6;	8.50, Dec. 29
15.00, Feb. 18;	11.25, Dec. 9
17.58, Jan. 29;	14.08, Dec. 3
16.50, Dec. 31;	13.08, July 2
15.25, Jan. 11;	13.08, Nov. 22

Pittsburgh Production Up to 45 Per Cent of Capacity

Heavy Ordering Against Second Quarter Contracts Marks End of First Phase of National Recovery Program

PITTSBURGH, June 27.—Specifications for finished steel products in this district are apparently reaching a peak this week prior to the expiration of old low-price contracts. Production schedules have also continued to gain on practically all products, but even the most optimistic foresee a slight tapering of activity during July. Recent orders clearly indicate that many consumers are taking out more steel than they are using in anticipation of higher prices, and it is also believed that raw steel stocks of large producers will soon be replenished.

While improved demand from the railroads and construction industry, the latter to be financed by the Federal Government, is in prospect for fall, the required tonnage cannot reach mills this summer. Although consumption of automotive steel and tin plate may be continued at a high rate, recent gains in steel output cannot be attributed to those sources, and it may be assumed that the first phase of the Government's recovery program may come to an end in the next two weeks.

The inauguration of a practical working code for the steel industry, which is said to be ready for the approval of Washington, will mark the beginning of a new chapter which offers nothing but conjecture at this time.

Steel ingot production in the Pittsburgh district this week has risen to 45 per cent, and blast furnaces have been added at Johnstown and Braddock, Pa. Eighteen steel works furnaces and one merchant stack are now active in the Pittsburgh district, while four more are in production at Johnstown. Steel output in the Valleys has shown no further gain and continues at about the same rate as last week. Wheeling district production is still holding at at least 85 per cent.

Tin mills are running at practical capacity, with some interruption because of hot weather. Strip production is at 50 per cent, while sheet mills average at least 45 per cent. Minor gains have been registered in wire and plate mills, while other products are holding their own.

Finished steel prices have not yet been announced for third quarter, but on many products producers have been forced to take business for July to be delivered prior to Aug. 15. In most cases recent maximum prices have prevailed, and some consumers

who had been enjoying a concession are being forced to pay the full quoted price. Strip steel contracts for the full quarter are being taken in some instances, although on practically all finished products steel makers are protecting themselves against advanced production costs by wage clauses in their contracts. Tin mill black plate has been advanced \$4 a ton to 2.50c., Pittsburgh, and some third quarter business has been booked.

Pig Iron

Although shipments of merchant iron this month have reached the best level in more than two years, few significant sales have been reported. Non-integrated steel companies using basic iron account for a large part of the heavier movement. During the last week a user of basic in the district is reported to have placed a small tonnage with a steel company furnace. Makers of ingot molds and iron and steel rolls are the most active iron consumers at this time, and jobbing units are still taking comparatively small tonnages. Producers are no longer willing to quote for the entire third quarter at present prices, and have turned down requests for coverage over the remainder of the year. The market is very firm on small spot sales.

Semi-Finished Steel

Sellers of billets, slabs and sheet bars are not yet quoting prices for third quarter, but pressure for coverage on immediate requirements may force some of them to take tonnage for July shipment at the current level of \$26, Pittsburgh or Youngstown. The same situation applies to forging billets, which carry the usual \$5 a ton premium over the rerolling grade. Wire rods are being quoted for July specification and shipment prior to Aug. 15 at \$35, Pittsburgh or Cleveland.

Bars, Plates and Shapes

With the exception of structural steel, movement of heavy hot-rolled products from local mills continues to improve. Demand for plates is much more active, with breweries accounting for a growing tonnage. The requirements of tank makers are also much heavier, and barge yards which have booked fair orders in the last few weeks are busier. Fabricated plate for large pipe lines is considerably more active. Merchant bars are moving in constantly increasing volume, and demand for alloy steel bars

from the automotive industry indicates no immediate cessation. Reinforcing bars are moving in better volume, although large projects are lacking. The Pennsylvania Railroad will close this week on 1500 tons of bars for a pier at Baltimore. Structural steel for this job, amounting to 4650 tons, has been placed with the McClintic-Marshall Corp. No other sizable fabricated jobs have been let in the last few days, and work in the immediate Pittsburgh district will be light until a number of projected Federal-aid projects get under way.

With definite third quarter prices on bars, plates and shapes still withheld by the mills, it is likely that present contracts at the 1.60c., Pittsburgh, price will be extended for a month. To some buyers who had been enjoying concessions this may amount to an advance, particularly on plates. Nevertheless, prices lower than 1.60c., Pittsburgh, on plates seem to have disappeared in this district, and mills are anxious to hold the market at the same level as bars and shapes. Reinforcing bar prices are strong, and mills are hesitant about making lengthy commitments at the current level.

Rails and Track Accessories

No new rail business has appeared in the last week, but track supplies are moving in comparatively good volume for this season of the year. While June usually registers a considerable decline from the previous month, shipments this year have been much higher. Accessory makers are not quoting for the third quarter, but the railroads are also uncertain as to developments in that industry, and in most cases are not pressing for coverage.

Bolts, Nuts and Rivets

The price of large rivets has been advanced \$5 a ton to \$2.50, Pittsburgh. The quotation applies only for tonnage booked during July for shipment prior to Aug. 15. Present discounts on bolts and nuts and small rivets have also been extended through July, although mills are unwilling to take contracts for the quarter. Demand continues to increase rather sharply in spite of small purchases by the railroads and the building industry.

Tubular Goods

Although the month has brought a fairly satisfactory improvement in shipments of standard pipe, the remaining tubular lines continue very dull. No further increases in output are reported, although the leading interest is now turning out a fair-sized tonnage at its Pittsburgh district plant, with the prospect of continued operation. The line pipe market is very dull. The Lycoming Gas Co. is still considering an extension to its line in New York State, which would require 2500 tons of pipe, but

no immediate action on the project is expected. A few feeder lines are coming up from time to time, but no major line pipe construction is now in prospect for the current year. Oil country goods are quiet, but further stabilization of production in the Mid-Continent fields is giving encouragement to makers of casing and drilling equipment. No change in pipe prices is reported, although an advance in boiler tube quotations may come out before the end of the month.

Wire Products

Current quotations on wire products have now been definitely extended through the month of July, with shipments to be completed prior to Aug. 15. This has enabled makers to book some new business, although specifications against old contracts continue to constitute the bulk of current tonnage. Demand from all consuming sources during June has shown a marked improvement over May, and purchases by jobbers are particularly encouraging. Current prices of \$1.85 a keg, Pittsburgh, on nails, and 2.10c. a lb. on manufacturers' wire are very firm.

Sheets

Specifications against old contracts are still very heavy, and mills have reached the point at which they are unable to promise shipment by July 15 without advancing rolling schedules sharply. Under the circumstances, it is planned to distribute this tonnage more equitably through the coming month, as a falling off in releases will almost certainly follow the passing of the June 30 deadline. Many consumers have been taking sheets recently at a higher rate than they have been using them, in order to take advantage of old low-priced contracts. No change in the character of demand is noticeable, and tonnage continues to be very diversified. Definite third quarter prices are still withheld by leading makers, although some of them have booked new orders for shipment during July at higher prices than those which have ruled recently. On this basis hot-rolled annealed sheets have been sold at 2.25c., Pittsburgh, and ordinary hot-rolled at 1.65c. The situation on cold-rolled material is less clearly defined, and most mills have avoided making new commitments until definite selling schedules have been determined. Tin mill black plate has been advanced \$4 a ton to 2.50c., Pittsburgh, and sales have been made at the higher level. Even on new sheet business taken at advanced prices, mills continue to include a wage clause to cover them against increased production costs.

Tin Plate

Specifications continue at the recent high rate, and many producers are now booked at practical capacity

for two months. Container manufacturers account for most of the increased tonnage as the result of revised estimates on practically all of the principal packs. Export tonnage is also a growing factor in the market, with Japanese business prominent. Production continues at 95 to 100 per cent of capacity, with curtailment forced by the hot weather reported in many instances. Extra turns are scheduled at many plants.

Strip Steel

Releases continue in heavy volume as the deadline for second quarter specifications approaches. Mills are insisting upon shipment before July 15, and new orders being booked are generally at 1.60c., Pittsburgh, for hot-rolled strip, and 2c. for cold-rolled. A number of important buyers are covered at these figures, but mills are still reluctant to take business for more than a month ahead and are generally protecting themselves against higher production costs. Mills in this and nearby districts are scheduled at about 50 per cent of capacity this week, and have sufficient tonnage ahead to run certain units full for two or three weeks.

Cold-Finished Steel Bars

In the absence of third quarter quotations, some producers are extending the present base price of 1.70c., Pittsburgh, into July. In the meantime, specifications are well sustained, and June business will run well ahead of May. In establishing a code for the cold-finishing industry in line with the National Industrial Recovery Act, some important changes in differentials are in prospect.

Scrap

Purchases of No. 1 heavy melting steel by a leading buyer at \$11.75 have established the market at the recent range of \$11.50 to \$12. A majority of the tonnage in this purchase was taken from a railroad, and in most cases participating dealers took only 1000 tons or less. The entire order involved from 10,000 to 12,000 tons. The sale clearly revealed the reluctance of scrap dealers to take orders at current price levels, as steel is difficult to obtain at less than \$11.50. The other grades of scrap are equally strong, although no sales have been made to change last week's quotations.

Coal and Coke

Increased blast furnace activity in the district and the inability of by-product ovens to come into production quickly has led to a shortage of by-product coke at some plants. The Steel Corporation has lighted a number of beehive ovens in the Connellsville district in order to take care of its requirements, while ovens at Clairton, Pa., which have been covered, are made ready. The market on by-product coking coal has also

stiffened because of scarcity, as most of the mines are controlled by steel producers, and a number are out of production because of labor troubles. The market on furnace coke has advanced to a minimum of \$2, Connellsville, with further increases in prospect. Foundry coke is also stronger, with no material available at less than \$2.75, Connellsville. The premium grades are still quoted at \$4 a ton, although producers are covered by wage clauses, and an advance in the base price is imminent. Unionizing activities continue throughout the Connellsville region, and the various producers are meeting with some difficulties in establishing a code for the industry which is satisfactory to them all.

Quotations Withdrawn on Pig Iron at Cincinnati

CINCINNATI, June 27.—Sales of pig iron, the past week, reached the highest level of the past three years. One south-central Ohio buyer took 500 tons of Northern foundry iron and two other Ohio melters and two Indiana consumers each bought 100 tons of the same grade. Further market strength is reflected in the withdrawal of all outstanding quotations on Northern iron in this district and the announcement that present prices are effective only on deliveries during July. Of course, melters who have previously contracted for shipment beyond July 31 will be protected. Foundry operations in the Cincinnati metropolitan area show no appreciable improvement, since the machine tool business has not yet been affected noticeably by the revival in other lines. Elsewhere in the district, automotive, refrigeration and jobbing foundries are working full time and in some instances the working week has been expanded to seven days.

Warehouse Business

Demand, chiefly from miscellaneous manufacturing quarters, is steadily increasing and inquiries give hope of a revival in building.

Steel

Demand for finished steel continues to increase, bookings the past week exceeding 60 per cent of capacity. Orders are well diversified as to source, with automobile and refrigeration manufacturers in the forefront.

Scrap

New business is still retarded by price difficulties and scarcity of material. Mills exert pressure on quotations, keeping dealers from making offerings because of the difficulty in obtaining scrap at prices quoted. Reported improvement in bids on the Southern Railway list the past week brought increases in the general list.

Steel Production at Chicago Reaches 55 Per Cent Level

Three Blast Furnaces Resume—Heavy Steel Specifications Believed to Include Some Speculative Tonnage

CHICAGO, June 27.—Steel ingot output continues to mount, having risen five points to 55 per cent of capacity. Another notable development is the rapidity with which steel works blast furnaces are being lighted. The leading independent has brought in another stack and the foremost producer has lighted two furnaces, one at Gary and one at South Works. The number of steel works furnaces now active is 13 out of 36, a gain of three in the last week. The one merchant stack now blowing is being put in full blast, thereby stepping up output about 50 per cent.

Demand for iron and steel is the best in almost two years and it is coming at an increasing pace from practically all industrial consumers. Part of the tonnage is admittedly speculative because consumers have not only the threat ahead of them of higher prices for materials but they can profitably at this time convert raw materials into semi-finished and finished products at lower labor cost than will be possible once the industrial control act is in full operation. Therefore consumers' stocks are growing not only in raw materials but also in finished goods.

Price policies are virtually all the same. Producers will not set prices beyond June 30, and yet they realize that consumers will ask for prices in the coming month before trade practices can be fully established under Government supervision. Protective clauses remain in use and without formal announcement most sellers will carry present quotations forward into July.

Pig Iron

June shipments will run about 20 per cent ahead of May and specifications now point toward further acceleration. New buying, though not spectacular, is in good volume, and the operator of one merchant stack now in use is putting it under full blast, thereby virtually doubling output. Prices for Northern iron are firm and orders will not be taken beyond the month of July.

Reinforcing Bars

Larger shipments and new business are nearer at hand as the States of Illinois and Wisconsin buy cement for road programs that have been held back since early spring. Some contractors on Illinois work have protection on needed steel, but there is still a round tonnage to be purchased. Most bar shops report more work in

the form of small jobs, and inquiries of like character are more numerous.

Cast Iron Pipe

Some improvement in business is noted, but no marked change is expected until federal funds reach municipalities that have construction plans. Low bidders have been announced on Chicago's needs. Milwaukee will buy 500 tons of pipe and fittings for an extension to a sewage treating plant. Ann Arbor, Mich., has placed an order for 400 tons of cast iron pipe. The Sanitary District, Chicago, is being forced, by a court ruling, to proceed with a large construction program. The Sanitary District Board is seeking funds at Washington for this work.

Rails and Track Supplies

The St. Louis-San Francisco has placed 4300 tons of 110 lb. rails with the Tennessee company. The rail market in the Chicago district is quiet except for a few releases that are affording local mills operations on a very moderate scale. Sellers appear to be rather confident that purchases this fall will be of good size. Demand for track accessories is increasing, but shipments are far short of the tonnage railroads normally need for general maintenance work.

Cold-Rolled Strips

Deliveries are averaging about three weeks unless orders happen to fall in line with rollings. Individual orders, though larger than earlier in the year, are still small and pressure for delivery is insistent. Output for the industry as a whole is about 35 per cent of capacity.

Structural Material

The Swenson Construction Co., Kansas City, is general contractor on the 5000-ton court house and jail at Kansas City. Awards are light, but better diversified than heretofore. Federal aid will soon add life to highway bridge work.

Wire Products

Output continues to gain and has now reached 55 per cent of capacity. Demand from farm areas is steady, being up in some parts of the country and down in others. Farmers are watching prices for crops and can be counted on to help support the wire market except in the central Mississippi Valley, which is threatened by drought. The manufacturing trade is pressing for larger tonnages. Automobile manufacturers are taking more wire than they did in May, and the

outlook for July shipments to them is very good. Utilities are asking for prices on copper wire and cables, but there is no assurance that they plan to increase their consumption of those products in the near future.

Sheets

The higher figure of price ranges now being quoted will apply to all business taken after June 30 for shipment in July, according to the plans of some producers. Output of sheets is slowly creeping above the 60 per cent mark. Heavy hardware manufacturers are swinging into larger production.

Plates

Miscellaneous tank business is improving and brewers are in the market for about 800 tons of plates. Colorado Springs, Colo., will buy 1500 tons of steel pipe and the railroads are making heavier repairs to equipment. The Milwaukee road is said to have taken all its switch engines out of white lead at Milwaukee. Some mills are carrying forward the present price of 1.70c., with a protective clause, for shipments during July.

Bars

Sellers, realizing that buyers will ask for prices after July 1 and that the control act will not be fully operative by that time, are now inclined to quote 1.70c. a lb., and the protective clause for such bars as will be ordered and can be processed and shipped in July. Orders are crowding farm implement repair part departments.

Scrap

Heavy melting steel has advanced 25c. a ton and may at any moment rise another 50c. a ton to \$9.75. Brokers are freely offering \$9.25, and deals now pending with consumers may readily carry prices to still higher levels. Supplies reaching switch tracks are adequate, in spite of the fact that much scrap is being held back by producers who are looking for higher prices. Car wrecking is gaining momentum and new programs are in the making, so that all in all supplies for still larger steel mill operations seem assured.

Reinforcing Steel

Awards 1125 Tons—New Projects, 3560 Tons

Lanett, Ala., 125 tons, bleachery, to Truscon Steel Co.

Portland, Ore., 1000 tons, public market, to Soule Steel Co.

NEW REINFORCING BAR PROJECTS

Baltimore, 1700 tons, Pennsylvania Railroad pier; bids received June 27.

Milwaukee, 3000 tons, addition to sewage disposal plant.

State of Colorado, 378 tons, highway bridges in 10 counties; bids under advisement.

State of Idaho, 181 tons, highway bridges in Valley and Shoshone counties; bids July 7.

Seattle, 1754 tons, Railway Avenue seawall; no bids received.

Jones Beach, N. Y., 3300 tons, six channel bridgeways, Jones Beach State Parkway Authority; Arundel Corp., New York, low bidder for general contract.

Eastern Pennsylvania Steel Output Rises Nine Points

Production Rate Now 35 Per Cent—Buyers Specify Heavily in Anticipation of General Price Advances

PHILADELPHIA, June 27.—Hurrying to cover at second quarter prices iron and steel consumers are increasing specifications sharply. Operations have been speeded up and have advanced nine points to 35 per cent or more of open-hearth capacity. While third quarter prices remain undetermined, pending submission of the basic code of the American Iron and Steel Institute to the National Recovery administration, consumers generally are of the opinion that higher levels will prevail. With only four days remaining of the current quarter they are in consequence taking advantage of contracts to specify against them.

In some lines at least, especially sheets, buyers without contracts are being booked at an increase of \$3 per ton for shipment at mills' convenience and subject to higher prices arising from Government action.

Makers of pig iron have withdrawn prices, but will ship at current levels through July, subject to confirmation. It is reported that an advance of \$2 a ton in pig iron for third quarter delivery is contemplated.

Where higher iron and steel prices are said to be under consideration they will represent necessary advances to avoid selling below cost. Because of this, it is contended, they will be consistent with the policy of the National Recovery administration not to permit selling below cost. How widespread increases may be is not known. Wage advances and higher raw material prices, it is said, will considerably increase costs of steel makers, who say they are still losing money on some products.

The heavier buying movement is widespread, and in some cases stocks are being accumulated, though most mills claim speculative purchases are relatively light. For the most part it is not believed the bulge in buying will be followed by a lag. The view is expressed that any slack that may develop will be taken up by railroads and other consumers that have been taking but little steel. Also the shipbuilding and public works program are being looked forward to as sources of large tonnages.

Pig Iron

All third quarter prices have been withdrawn by furnaces in this district. Bookings are being accepted at existing levels for July, subject to confirmation, depending on levels that will grow out of the code of fair com-

petition. There are reports that consideration has been given to a \$2 advance for the third quarter. Furnaces have greatly increased shipments. One maker will have shipped about four times as much tonnage in June as was shipped in May. The largest sale of basic iron for some months, reported last week, involved 9000 tons. A domestic maker also is reported to have taken a large tonnage of this grade of iron that is understood to have been transferred from an account for foreign iron.

Plates, Shapes and Bars

Mills are awaiting prices under the code of fair competition before quoting for the third quarter. There are unconfirmed reports that a quotation of 1.70c., Coatesville, has been considered for plates. The second quarter price generally is quoted at 1.40c. Specifications against existing contracts have increased somewhat. Two railroads in this district have placed about 2500 tons for repair work and it is said a fair buying movement of this kind is an early prospect, probably to be followed by heavier purchases for cars, locomotives and track work. The fabrication job for the Pennsylvania Railroad pier at Baltimore, involving 4500 tons, went to the McClintic-Marshall Corp'n. Bids for about 1700 tons of reinforcing bars for the same project were received today by the Pennsylvania. Reinforcing bar business is rather quiet. It will be given a substantial impetus by the \$400,000,000 highway fund to be made available on July 1 to the States by the Federal Government. It will take about a month, however, before bids will be ready. Orders likely will be placed in August and call for rollings up to November, when cold weather probably will halt highway work in the North.

Sheets

Specifications against second quarter contracts are heavy. Consumers are covering freely in anticipation of higher prices for the third quarter. Mills say that on some grades, especially cold-rolled and pickled material, that they are losing money despite the fact that operations are practically at full capacity. With higher wages a certainty it is contended that increased levels are necessary. Buyers not protected by contracts are being booked at \$3 a ton over contract prices, the higher levels being the equivalent of those which mills withdrew several weeks ago. De-

liveries of sheets have been further deferred and chiefly range from three weeks to one month. Not only has automotive demand increased, but it is reported that even heavier requirements from this source are in prospect.

Warehouse Business

Jobbers report that tonnages covering a broad variety of lines are moving on the recently increased basis of purchases. Warehousemen also are covering more freely for requirements from mills at second quarter quotations.

Imports

The following iron and steel imports were received here last week: 1210 tons of pig iron from British India, 1000 tons of chrome ore from Cuba, 107 tons of structural shapes from Belgium and 49 tons of the same product together with 28 tons of steel bars from France, 100 tons of ferromanganese from Norway, and 52 tons of sponge iron from Sweden.

Scrap

The market is firm and demand is good. Dealers report difficulty in getting material, which apparently is being held in anticipation of higher prices under the code of fair competition to be submitted by the Institute of Scrap Iron and Steel. It is said consideration has been given to fixing prices on differentials based on either pig iron or steel levels. Machine shop turnings have moved up \$1 per ton and cast iron borings 50c. a ton on the strength of sales in this district the past week.

Two Blast Furnaces Go In at Buffalo

BUFFALO, June 27.—The furnace of the Tonawanda Iron Corp'n., American Radiator Co. subsidiary, was blown in June 23, the first time this unit has operated since September, 1930. The Port Colborne, Ont., stack of the Canadian Furnace Corp'n., is due to go in shortly and the second Republic Steel blast furnace is being prepared for operation July 1, if needed. The Lackawanna plant of the Bethlehem Steel Corp'n. placed its second blast furnace in operation over the week-end. Pig iron buying continues, though most of the larger users have covered for their requirements for the immediate future. Sales aggregated 3000 to 4000 tons for the past week.

Steel

The Lackawanna plant of the Bethlehem Steel Corp'n. continues to operate 12 open-hearths; the Republic Steel Corp'n., four, and Wickwire-Spencer, one. The Seneca sheet division of Bethlehem is running at 60 to 70 per cent of capacity. Word from Detroit is that even more automobile business will come out in July than

during June. A pick-up has occurred in the number of small fabricated structural orders. A contract for 100 tons of structural steel for a conveyor for the Harris Milling Co. has been awarded a local contractor.

Scrap

A 4000-ton sale of No. 2 heavy melting steel is reported at \$9 to \$9.25. Specialties have been sold at \$12 to \$12.50. Brokers are offering \$8.75 freely for No. 2 steel, delivered consuming plant. Sales of No. 1 machinery cast scrap are reported at \$10.50.

Coast Tower Job to Take 30,000 Tons of Steel

SAN FRANCISCO, June 26.—Work is to start shortly on the Boulder Dam transmission line for which the Los Angeles Bureau of Water and Power will take bids on July 14 on 2256 steel towers, which revised specifications show will require approximately 30,000 tons of structural steel. It is reported that the steel will be fabricated in one of the local plants but that the erecting will be by the bureau. At Seattle no bids were received on the Railway Avenue seawall which called for 3561 tons of sheet piling, 1754 tons of bars and 770 tons of cast iron. The Soule Steel Co. took 1000 tons of reinforcing bars on the public market at Portland.

Only 1206 tons of bars were placed during the week, and new inquiries are confined to 822 tons of structural steel and 590 tons of reinforcing bars. The cast pipe market failed to show any sizable award or inquiry, although several utility companies are known to be planning work. Reinforcing bars, for the first time in many months, have shown a decided tendency to strengthen. Plates are also reported firm. General business conditions continue to improve on the Coast, with building permits for May ahead of April and for the corresponding month in 1932. Dollar retail sales for the first time in three years showed an increase for May over the same month in the preceding year.

Scrap Strong in Detroit Market

DETROIT, June 27.—With relatively large tonnages of scrap coming out of the automobile industry and with shipments on current contracts to steel mills being well maintained, scrap prices acquired further stability the past week, although no changes occurred. Users outside this district, particularly at Youngstown, continue to take a substantial portion of the steel scrap produced here.

End of Quarter Sees Flood of Orders in New York

Specifications Against Second Quarter Contracts Are Unusually Heavy—Tin Mills May Be Forced to Allocate Shipments

NEW YORK, June 27.—Specifications for steel are pouring in as the end of the month approaches. In a number of cases bookings of local sales offices this month are double those of May, which in turn were twice as large as those of April. While there is undoubtedly some ordering for stock, it is a common observation that most of the steel being shipped is going into immediate use. Pressure for deliveries has become so great that allocation may have to be resorted to, particularly in the case of tin plate. Tin mills are running full, or at least to the extent that the weather will permit. Already the heat is interfering with the production of both tin plate and sheets. Among the active consumers of sheets in this section are manufacturers of refrigerators, who are running virtually at capacity. Electrical sheets are about the only grade of sheets that are not in active demand. The unusual activity in the shoe industry has stimulated business in tack plate.

Business from the railroads and the building industry continues to lag. However, the carriers are buying more accessories and there are indications that certain structural jobs will be expedited because of the prospect of higher prices. The status of 47 construction jobs on which the Government took bids early in the year is in doubt. While the low bidders have protection on their material, they are asking that the Government advance the difference between labor costs as figured and as they will stand as a result of advances in keeping with the national recovery program. The Texas Co. is in the market for tanks for Port Arthur, Tex., requiring 2200 tons of plates.

A number of mills have advanced prices on tin mill black plate \$4 a ton to 2.50c. a lb., Pittsburgh. In general, action on prices is being deferred until it is definitely known what increased labor costs will be. A general increase of 10 per cent in wage rates would raise production costs \$2 to \$5 a ton, according to various estimates.

Pig Iron

Quotations are now being generally restricted to deliveries through July. Producers are unwilling to make further commitments beyond that period because of the prospect of higher producing costs during the latter part of the year. Furnace prices consequently face probable upward revisions as of Aug. 1. The number of

open inquiries has not increased materially, but several large users are understood to be quietly negotiating for additional iron. Jobbing foundries, which have experienced a general betterment in their business are requesting furnaces to accelerate deliveries. June deliveries on the whole, however, are not expected to outrun those in May. Fresh buying is in moderate volume. Last week's bookings aggregated about 4000 tons, compared with 3000 tons in the preceding period and 3500 tons two weeks ago. Prices are firm, with Buffalo quotations notably strong for delivery to the metropolitan area. Foreign iron is more active, despite hampering effects of daily exchange irregularities.

Reinforcing Bars

Specifications covering major construction work are still lagging. The prospective release of Government projects, however, is expected to open up a definitely improved demand for bars in the fall. The market is currently sustained by a steady flow of small-lot specifications, most of which involve public jobs. Mills are still withholding announcement of third quarter quotations. Award of 3200 tons for bridge construction at Jones Beach, N. Y., will probably be made this week. Bids will be opened June 28 for 300 tons for the Wassaic State School, Wassaic, N. Y.

Scrap

Regardless of a lack of significant consumer buying, prices have developed strength at higher levels. Brokers' bids have been stepped up 25c. to \$1 a ton on many grades. No. 1 steel for both rail and barge loading is now quotable at \$6 to \$6.50 a ton, and No. 2 at \$5 to \$5.25. Stove plate has risen 50c. a ton on continued strong demand. Rails for rolling and cast grades are also higher. No. 1 blast furnace scrap is being purchased by dealers at \$3 to \$3.50, representing an increase of 50c. a ton. Shipments to consumers are moving briskly. A fairly good-sized movement of No. 2 steel continues for delivery at Buffalo, N. Y.

WASHINGTON, June 27.—The production of Babbitt metal in May rose to 2,110,621 lb., from 1,544,045 lb. in April, according to reports received by the Bureau of the Census from 40 manufacturers. The output in the first five months of 1933 totaled 5,989,912 lb., compared with 5,620,640 lb., in the corresponding period of last year.

Steel Output Now 71 Per Cent of Capacity in Cleveland Area

Specifying Is Heavy, But Forward Buying Is Discouraged by Delay of Mills in Announcing Prices

CLEVELAND, June 27.—Orders for finished steel increased during the week as consumers sent in releases against expiring second quarter contracts. Demand is largely for steel bars, sheets and hot and cold-rolled strip. In view of expected price advances many consumers are ordering steel to build up their stocks, which have been kept very low.

Ingot output in the Cleveland district increased four points this week as a result of the addition of two open-hearth furnaces by the Corrigan, McKinney and Otis Steel companies. The former is now operating 13 out of 14, and the latter all of its eight furnaces. Ingot output in Cleveland is now 61 per cent of capacity and in the district including Lorain 71 per cent of capacity.

Third quarter prices are still undetermined. However, many of the producers are taking orders for July shipment either at present prices or subject to revision should production costs be increased. Consumers are not showing much desire to place orders for future delivery subject to price revision. However, with the large tonnage of steel that is being taken against second quarter contracts, most consumers will be well covered against their July requirements.

Pig Iron

New demand is holding to recent volume and June sales will be about the same as during May. Shipments during June will be about 30 per cent heavier than last month. One producer sold about 6000 tons during the week. In view of the uncertainty about costs during the third quarter, a leading interest is now declining to take any new business for delivery beyond Aug. 1. The general foundry situation showed a moderate improvement. Prices are unchanged at \$15.50, Cleveland, for foundry and malleable iron for both local delivery and outside shipment.

Sheets

Specifications continue heavy from the automotive and refrigerator industries and from miscellaneous consumers. In the absence of third quarter prices some new business is being taken for July shipment at present prices, but subject to withdrawal any day. Ruling quotations for new business are 2.25c., Pittsburgh, for No. 24 hot-rolled annealed; 2.40c. to 2.45c.

for cold-rolled; 2.60c. for auto body, and 2.85c. for galvanized. As a result of specifications the last few days some of the mills have taken enough tonnage on old contracts to keep them well filled up through July for some grades.

Plates, Shapes and Bars

Orders for bars are heavy. Consumers are specifying freely against second quarter contracts, although many are not ordering the full tonnage of these contracts. Specifications will be accepted against these contracts through June 30. Activity in the structural field is light. Protection at present prices will be given by mills to fabricators for specific jobs. Plates are fairly active. About 1850 tons has been placed by the Southern Alkali Co., Barberton, Ohio, for pipe, tanks and evaporators for its Corpus Christi, Tex., plant. The

recent advance in the mill price to 1.50c., Cleveland, for new billet steel reinforcing bars has held in a round-tonnage sale. Merchant bars are firm at 1.55c., Cleveland.

Strip Steel

Demand from the automotive industry continues heavy. Some motor car plants have increased specifications and are crowding mills for delivery. As orders against old contracts will be accepted until June 30, many consumers will have their July requirements well taken care of at their contract prices. Some of the mills are taking orders at present prices for July shipment. Ruling quotations are 1.55c. to 1.60c., Pittsburgh, for hot-rolled strip, and 1.80c. to 2c. for cold-rolled material.

Scrap

Shipments are being made at a good rate to local and Valley mills against contracts, but there have been no fresh purchases by consumers. New buying is expected around the first of the month. Prices are very firm but unchanged. Several cargoes of scrap reached Cleveland during the week from Detroit, Monroe, Mich., and Duluth. Some of the motor car companies have issued sizeable lists for July.

Canadian Steel Output Headed Upward

TORONTO, ONT., June 27.—New business is developing on a larger scale in the Canadian iron and steel industry and indicates higher operating schedules for the immediate future. While the industry has been running at around 12 to 15 per cent capacity for several months past, it is stated that the rate will soon be stepped up to between 40 and 50 per cent.

The Steel Co. of Canada, Ltd., Hamilton, Ont., will blow in its smaller blast furnace of 350 tons capacity on July 1, and will start another open-hearth soon. This will give the company four active open-hearth furnaces.

Operations at the Sydney steel plant of Dominion Steel & Coal Co. will proceed on a basis of 50 to 60 per cent for the remainder of the year. This estimate is based on orders already booked, including one for 50,000 tons of steel rails from the Dominion Government.

Canadian pig iron producers have reduced prices \$1.60 per ton, making the first revision in approximately three years. Current prices are as follows: No. 1 (2.25 to 2.75 silicon), \$21; malleable, \$21; No. 2 (1.75 to 2.25 silicon), \$20.50, Toronto. The

revised Montreal quotations are: No. 1 and malleable, \$22.50, and No. 2 and basic, \$22. While the revised price list has been in effect for a few days, it has so far failed to stimulate demand and new business continues dull.

Scrap dealers report a fair demand for steel scrap on export account, but no orders for domestic consumption. Price lists are unchanged.

Pig Iron Sales Gain at Boston

BOSTON, June 27.—Local pig iron sales took quite a jump the past week, aggregating more than 4000 tons, contrasted with less than 500 tons the preceding week. It is understood the Mystic Iron Works privately negotiated some substantial tonnages with Connecticut, Massachusetts and Rhode Island melters. Although little definite action has been taken, there is a general tendency among furnaces to tighten up. They are less willing to sell for forward delivery, and in some instances have withdrawn prices. It is unofficially reported that Buffalo iron will be advanced soon, and Superior charcoal iron is now not less than \$20 a ton, furnace, as against \$18 a month or so ago. Ferromanganese and spiegeleisen prices have been advanced, and the cost of other found-

dry necessities tends upward. There are no open tonnages in the market.

Comparatively little scrap is moving in and out of New England, as buyers and sellers cannot agree on price. Brokers have more orders to work on than they did on June 1, and they assume that contracts will be closed early next month. No. 1 heavy melting steel, steel turnings and engine blocks are the most active materials just now. Prices are firm and unchanged.

Two Blast Furnaces Added at Birmingham

BIRMINGHAM, June 27.—Two additional blast furnaces in the Birmingham district were blown in last week, raising the district total from four to six. Another may be blown in within the next week or ten days. The two new furnaces are Ensley No. 6, of the Tennessee Coal, Iron & Railroad Co., which began producing on Friday on basic iron, and No. 1 of the Sloss-Sheffield Steel & Iron Co., which began on foundry iron on Saturday. This is the highest number of active stacks since April, 1932. The Tennessee company is also planning to blow in Fairfield No. 5, which will further increase the district's total to seven. Of the six active stacks, three are on basic and three on foundry.

June shipments of the three merchant producers in the district have exceeded production for the second consecutive month and will be the best in about two years. Third quarter tonnage continues to accumulate, and the furnace companies will begin the next quarter with a substantial amount of forward tonnage on their books. No change in the price of \$12 has yet been announced, but an increase of at least \$1 is said to be in prospect.

Steel

Bookings have been growing rapidly this month, and for both of the steel producers in the district June business will be the largest in about two years. Demand has been general and some mills are operating on full schedules. Railroads are buying more freely and this has given marked impetus to bookings. It is noticeable that jobbers and dealers are giving the first real attention in a long while to their stocks. No changes in prices have been made and current second quarter quotations have been extended to July shipments.

Last week 13 open-hearths were active in the district, an increase of one over the preceding week and the largest number since July, 1931. For the first time, all nine units at the Fairfield plant of the Tennessee Coal, Iron & Railroad Co. were working. Announcement was made Friday that five open-hearths at the Ensley works

of the Tennessee company would be placed in operation early in July and that the Ensley rail mill would begin rolling July 10 for a period of from two to three weeks.

Sheet Sales and Shipments Rose Again in May

Sales, production and shipments of sheet steel products all rose sharply during May for the second consecutive month, according to the report of the National Association of Flat Rolled Steel Manufacturers, Pittsburgh, which includes producers with a monthly capacity of 325,000 net tons. This is approximately 59 per cent of the country's total capacity of 550,000 net tons monthly. These makers report sales of 144,192 net tons in May, as compared with 118,594 tons in April; production of 139,696 tons as compared with 111,942, and shipments of 119,159 tons as compared with 100,353 tons. Unfilled tonnage as of June 1 amounted to 136,592 tons or 42.1 per cent of capacity, as against 111,311 tons or 34.3 per cent of capacity one month before. The May report with comparisons of the two preceding months in net tons follows:

	May	April	March
Sales	144,192	118,594	83,295
Production ...	139,696	111,942	64,724
Shipments	119,159	100,353	74,880
Unfilled orders	136,592	111,311	91,993
Unshipped orders	47,696	44,044	43,407
Unsold stocks ..	51,295	47,815	52,199
Capacity per month	550,000	550,000	550,000
Percentage reporting	59.0	59.0	60.0

Percentages, Based on Capacity

Sales	44.4	36.5	25.3
Production	43.1	34.5	19.6
Shipments	36.7	30.9	22.7
Unfilled orders	42.1	34.3	27.9
Unshipped orders	14.7	13.6	13.2
Unsold stocks	15.8	14.7	15.8

Describes Rapid Rise Of Alloy Cast Iron

How alloy cast iron has become so firmly established in the industrial world that its use in the future is expected to be considerably extended is told in an exchange paper by F. B. Coyle, research metallurgist of the International Nickel Co., which was presented June 23 at the annual conference in Cardiff, Wales, of the Institute of British Foundrymen.

The paper gives a statistical picture of the spectacular growth of the alloy cast iron industry in the United States and Canada since its beginning eight years ago. Fully 22 per cent of all the foundries in North America produced alloy cast iron in 1932, as compared with about 2½ per cent in 1925, and the percentage of

alloy iron to total cast iron production jumped ten times in the same period, from 0.2 per cent to 2 per cent.

"While alloy cast iron was known in 1925," Mr. Coyle explains, "little had been done up to that time to find new uses and to develop in it properties that would make it more valuable to industry. Intensive development of these alloys has considerably extended the field of application of cast iron and has increased industrial and engineering demand for them.

Representative data illustrating industrial applications have been included in the paper to demonstrate why the alloying elements have proven valuable not only in general castings production but in extending the applicability of iron castings in specialized fields.

International Nickel Steps Up Production

The mines and plants of International Nickel Co., of Canada, in the Sudbury district, taken as a unit, have been operated at approximately 20 per cent of capacity. Due to the present increase in demand for nickel, production has been stepped up to approximately 40 per cent of capacity.

The operating schedule for nickel production now in effect calls for two blast furnaces at Coniston, and two reverberatory furnaces at Copper Cliff. Creighton Mine will furnish 30,000 tons of ore per month, and Frood Mine 100,000 tons per month. At the Port Colborne Refinery, the company is now operating five of its nine electrolytic circuits.

Pipe Lines

Magnolia Pipe Line Co., Dallas, Tex., an interest of Magnolia Petroleum Co., same place, has authorized 8-in. steel pipe line in new Tomball oil field, northern part of Harris County. Project will include steel tanks and pumping station for storage and distribution.

Northern Natural Gas Co., Lincoln, Neb., has begun work on new steel pipe line to Minneapolis, and is scheduling completion early in fall.

Bureau of Water, City-County Building, Pittsburgh, plans steel pipe line in Smallman Street, to replace present trunk main. Work will be carried out in connection with \$100,000 bond issue recently authorized.

North Middletown Natural Gas Co., North Middletown, Ky., care of Henry S. Caywood, North Middletown, recently organized, plans installation of steel pipe lines for service at North Middletown and neighboring communities.

Humble Oil & Refining Co., Humble Building, Houston, Tex., has authorized 6-in. welded steel pipe line from Hilbig, Eastrop County oil fields to Luling, Tex., and vicinity, about 45 miles. Cost close to \$100,000.

James S. Bicknell, president, Citizens' State Bank, Clare, Mich., is at head of group of Clare County gas producers who are planning a natural gas welded steel pipe line from gas fields in Clare County to Saginaw, Mich., and vicinity. Cost over \$100,000.

Chicago is in the market for 2000 ft. of 6-in. steel pipe for Chicago Avenue water tunnel.

Colorado Springs, Colo., is inquiring for 1500 tons of steel pipe.

Tin Moves Higher—Other Metals Remain Firm and Unchanged

Spot Straits Reaches 46c. Level on Sharp Sterling Advance—
Lead, Zinc Moderately Active; Copper Still Neglected

NEW YORK, June 27.—The domestic copper market failed in the past week to shake off entirely the inertia that has prevailed for several weeks. Consumer interest is slightly improved. But the absence of significant developments here during the past week offered no fillip to buying, which is limited to imperative spot needs. Prices, however, have maintained their recent firmness. Leading sellers are exerting little pressure to dispose of the red metal, even at 8c., Connecticut basis, and, while copper is available for shipment through October, offerings are more generally restricted to shipment through September. Deliveries to consumers continue at an unabated pace. Brass fabricators are particularly prominent takers, while wire manufacturers continue to withhold shipping releases. The relatively steady movement to consumers during the first half of the year is expected to result

in a shrinkage of about 70,000 to 80,000 tons in copper stocks at the close of June. The position of stocks at that time, it is contended, will influence to a large extent the establishment of prices under the Industrial Recovery Act. Although trade views concerning prospective price revisions are largely conjectural, leading factors are united in the belief that no sharp advance in copper prices will occur.

Foreign markets, after irregular trends early in the past week, assumed stronger tendencies today, with a good volume of buying reported this morning at 7.75c. to 7.90c. a lb., c.i.f. European ports.

Tin

After pursuing an irregular course last week, tin prices yesterday and today surged ahead on sharp advances in sterling. Spot Straits at

New York today was quotable at around 46c. a lb., while English refined was available at about 2c. lower. A good volume of sales of the latter grade was reported for the week. Tin plate manufacturers continue to be the chief participants in current dealings, with automobile makers next in importance. With activity in those consuming quarters showing no evidence of slackening, demands for deliveries have not been relaxed. Most tin consumers have found it virtually impossible to build up stocks, owing to the inability of importers to satisfy the insistent calls for shipments. The present embarrassment on the part of both consumers and dealers may account for a more general mood to cover for forward requirements. A good share of the week's business involved deliveries as far ahead as December. In London, values suffered slight net losses for the week, with today's postings £224 17s. 6d. a ton for spot standard, £223 17s. 6d. for future standard, and £240 17s. 6d. for spot Straits. A similar situation existed in the Singapore market, which today was quoted lower at £238 15s. London stocks fell 540 tons last week to 22,122 tons. Straits shipments up to and including June 24 totaled 4867 tons.

Lead

Although buying has lost some of the vigor of a week ago, inquiry continues in satisfactory volume. Bookings for July delivery have already reached a total of 33,000 tons, indicating that estimated consumer requirements are practically covered for that month. The leading smelters have consequently opened their books for limited quantities for August shipment. Prices are notably firm at 4.05c. a lb., St. Louis, and 4.20c., New York.

Zinc

A moderately active demand throughout the week has kept this market on an even keel. Prices reflect a stronger tone. While limited quantities of prime Western metal are still available at 4.35c. a lb., East St. Louis, or 4.72c., New York, offerings are generally held at 4.40c., East St. Louis, or 4.77c., New York. The prime Western price position has been steadied further by sustained strength in the Joplin ore market, which is unchanged at \$30 a ton. Ore sales last week aggregated 2900 tons, against shipments of 5700 tons. Estimated output of ore for the current week is 4800 tons.

Dayton Fabricating Steel Co., Dayton, Ohio, is moving to 1300-1400 East Monument Avenue, and will occupy old fabricating shop of Barney & Smith Car Co., formerly used by L. Emmerman Machinery Co. Plant is 75 x 500 ft. and is equipped to fabricate structural steel, ornamental and other iron. In addition company will handle steel sash, fire doors, fence and hollow metal doors. Carl Jauch is president and treasurer; Clem Jauch, secretary and Roger Lint, vice-president and shop superintendent.

The Week's Prices. Cents Per Pound for Early Delivery

	June 21	June 22	June 23	June 24	June 26	June 27
Electrolytic copper, N. Y.*	7.75	7.75	7.75	7.75	7.75	7.75
Lake copper, New York	8.00	8.00	8.00	8.00	8.00	8.00
Straits tin, Spot, N. Y.	44.75	45.25	44.50	45.50	46.00	46.00
Zinc, East St. Louis	4.35	4.35	4.35	4.35	4.35	4.35
Zinc, New York	4.72	4.72	4.72	4.72	4.72	4.72
Lead, St. Louis	4.05	4.05	4.05	4.05	4.05	4.05
Lead, New York	4.20	4.20	4.20	4.20	4.20	4.20

*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.50c. a lb., New York.
Brass ingots, 85-5-5-5, 8c. a lb., New York and Philadelphia.

From New York Warehouse	
Delivered Prices, Base per Lb.	
Tin, Straits pig	47.00c. to 48.00c.
Tin, bar	49.00c. to 50.00c.
Copper, Lake	9.00c. to 9.75c.
Copper, electrolytic	8.75c. to 9.25c.
Copper, castings	8.50c. to 9.50c.
*Copper sheets, hot-rolled	15.62½c.
*High brass sheets	13.25c.
*Seamless brass tubes	14.87½c.
*Seamless copper tubes	15.12½c.
*Brass rods	10.75c.
Zinc slabs	5.50c. to 6.00c.
Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Lead, American pig	4.87½c. to 5.87½c.
Lead, bar	6.25c. to 7.25c.
Lead, sheets	7.75c.
Antimony, Asiatic	8.00c. to 9.00c.
Alum., virgin, 99 per cent plus	22.30c.
Alum. No 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ⅓	29.00c. to 30.00c.
Babbitt metal commercial grade	25.00c. to 50.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse	
Delivered Prices per Lb.	
Tin, Straits pig	49.50c.
Tin, bar	51.50c.

Copper, Lake	9.12½c.
Copper, electrolytic	9.12½c.
Copper, casting	8.50c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig	5.35½c. to 5.50c.
Lead, bar	8.50c.
Antimony, Asiatic	8.50c.
Babbitt metal, medium grade	19.00c.
Babbitt metal, high grade	53.50c.
Solder, ½ and ⅓	27.50c.

Old Metals. Per Lb.. New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.50c.	7.00c.
Copper, hvy. and wire	6.25c.	6.75c.
Copper, light and bottoms	5.00c.	5.875c.
Brass, heavy	3.50c.	4.00c.
Brass, light	2.75c.	3.50c.
Hvy. machine composition	4.75c.	5.25c.
No. 1 yel. brass turnings	4.00c.	4.50c.
No. 1 red brass or compos. turnings	4.75c.	5.00c.
Lead, heavy	3.25c.	3.75c.
Zinc	2.25c.	2.75c.
Cast aluminum	6.50c.	7.50c.
Sheet aluminum	11.75c.	13.50c.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.91c.
Del'd New York	1.95c.
Del'd Detroit	1.80c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.70c.
C.I.F. Pacific ports	2.10c.

Billet Steel Reinforcing

(Cut lengths as quoted by distributors)

F.o.b. P'gh mills	1.75c.
F.o.b. Birmingham	1.75c.
F.o.b. Cleveland	1.75c. to 1.90c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.50c.
F.o.b. Chicago Heights mills	1.50c.

Iron

Common iron, f.o.b. Chicago	1.60c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	1.86c.
Common iron, del'd New York	1.90c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.4935c. to 1.5935c.
F.o.b. Coatesville	1.40c. to 1.50c.
F.o.b. Sparrows Point	1.40c. to 1.50c.
Del'd New York	1.595c. to 1.695c.
C.I.F. Pacific ports	2.00c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7495c.
Del'd New York	1.8675c.
C.I.F. Pacific ports (standard)	2.10c.
C.I.F. Pacific ports (wide flange)	2.20c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.00c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars

(F.o.b. Pittsburgh, Chicago, Buffalo, Massillon or Canton.)

Alloy Quantity Bar Base. 2.45c. to 2.65c. per Lb.

S.A.E. Series	Alloy Differential per 100 Lb.
2000 (1/2% Nickel)	0.35
2100 (3/4% Nickel)	0.55
2300 (3/4% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	2.30
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.16 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (slats)	0.25
Rounds and Square	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars forging quality. The differential for cold-drawn bars is 3/4c. a lb. higher, with standard classification for cold-finish alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis. Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

Cold Finished Bars*

Bars, f.o.b. Pittsburgh Mill	1.70c.
Bars, f.o.b. Chicago	1.75c.
Bars, Cleveland	1.75c.
Bars, Buffalo	1.75c.
Bars, Detroit	1.90c.
Bars, eastern Michigan	1.95c.
Shafting, ground, f.o.b. mill	1 1/4 in. 3.00c.
	1-3/16 to 1 1/2 in. 2.50c.
	1-9/16 to 1 3/4 in. 2.35c.
	1-15/16 to 2 in. 2.20c.
	2-15/16 to 6 in. 2.05c.

* In quantities of 10,000 to 19,999 lb.

SHEETS, STRIP, TIN PLATE

TERNE PLATE

Sheets

Hot-Rolled

No. 10, f.o.b. Pittsburgh	1.50c. to 1.65c.
No. 10, f.o.b. Chi'o mill	1.60c. to 1.75c.
No. 10, del'd Philadelphia	1.81c. to 1.96c.
No. 10, f.o.b. Birmingham	1.63c. to 1.80c.
No. 10, c.I.F. Pacific Coast ports	2.12 1/2c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.10c. to 2.25c.
No. 24, f.o.b. Chi'o mills	2.20c. to 2.35c.
No. 24, del'd Philadelphia	2.41c. to 2.56c.
No. 24, f.o.b. Birmingham	2.25c. to 2.40c.
No. 24, c.I.F. Pacific Coast ports	2.75c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled (Mill Run)

No. 10, sage, f.o.b. Pitts'h	1.80c. to 1.95c.
No. 10, sage, f.o.b. Chicago mills	1.90c. to 2.05c.
No. 10, sage, del'd Phila.	2.11c. to 2.26c.
No. 10, sage, del'd Pacific Coast ports	2.70c.

Light Cold-Rolled (Mill Run)

No. 20, sage, f.o.b. Pitts'h	2.25c. to 2.40c.
No. 20, sage, f.o.b. Chicago mills	2.35c. to 2.50c.
No. 20, sage, del'd Phila.	2.55c. to 2.71c.
No. 20, sage, del'd Pacific Coast ports	2.95c.

Auto Body and Steel Furniture

No. 10, f.o.b. Pittsburgh	2.00c. to 2.15c.
No. 20, f.o.b. Pittsburgh	2.45c. to 2.60c.
No. 20, f.o.b. Chicago	2.55c. to 2.70c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.70c. to 2.85c.
No. 24, f.o.b. Chicago mills	2.95c.
No. 24, del'd Philadelphia	3.16c.
No. 24, f.o.b. Birmingham	2.85c.
No. 24, c.I.F. Pacific Coast ports	3.35c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Terne

No. 24, unassorted, 8-lb. coating	f.o.b. Pittsburgh 2.75c. to 2.90c.
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Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	2.90c.
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Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.50c.
No. 28, Chicago mill	2.60c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	\$4.25
Standard cokes, f.o.b. Gary	4.35

Terne Plate

	Base per Box
(F.o.b. Morgantown or Pittsburgh) (Per Package, 20 x 28 in.)	
8 lb. coating I.C.	\$8.70
15-lb. coating I.C.	11.00
20-lb. coating I.C.	13.90
25-lb. coating I.C.	13.60
30-lb. coating I.C.	13.80
40-lb. coating I.C.	15.30

Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 in.

	Base per Lb.
All widths up to 24 in., Pittsburgh	1.55c. to 1.60c.
All widths up to 24 in., Chicago	1.65c. to 1.70c.
Cooperage stock, P'gh	1.55c. to 1.60c.
Cooperage stock, Chicago	1.65c. to 1.70c.

Cold-Rolled Strips

F.o.b. Pittsburgh	2.00c.
F.o.b. Cleveland	1.80c. to 2.00c.
Del'd Chicago	2.30c.
F.o.b. Worcester	2.15c.
Fender stock, No. 20 sage, Pittsburgh	2.60c.
Cleveland	2.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)
Extras of 10c. a 100 lb. on mixed and joint carloads, 20c on pool carloads and 30c. or less than carloads are applied on all merchant wire products. In carloads and mixed carloads a discount of 10 per cent on extras is allowed.

To Manufacturing Trade

Bright wire	2.10c.
Spring wire	3.10c.

To Jobbing Trade

	Base per Keg
Standard wire nails	\$1.85
Smooth coated nails	1.85
Galvanized nails	3.35
	Base per 100 Lb.
Smooth annealed wire	\$2.25
Smooth galvanized wire	2.60
Polished staples	2.55
Galvanized staples	2.80
Barbed wire, galvanized	2.35

Woven wire fence No. 9 gage, base column, per net ton \$50.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago and Anderson prices are \$2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

Butt Weld

Inches	Steel	Galv.	Inches	Wrought Iron	Black Galv.
1/2	33	33	1 1/2	33	33
3/4	33	33	2	33	33
1	33	33	2 1/2	33	33
1 1/4	33	33	3	33	33
1 1/2	33	33	3 1/2	33	33
1 3/4	33	33	4	33	33
2	33	33	4 1/2	33	33
2 1/4	33	33	5	33	33
2 1/2	33	33	5 1/2	33	33
2 3/4	33	33	6	33	33
3	33	33	6 1/2	33	33
3 1/4	33	33	7	33	33
3 1/2	33	33	7 1/2	33	33
3 3/4	33	33	8	33	33
4	33	33	8 1/2	33	33
4 1/4	33	33	9	33	33
4 1/2	33	33	9 1/2	33	33
4 3/4	33	33	10	33	33
5	33	33	10 1/2	33	33
5 1/4	33	33	11	33	33
5 1/2	33	33	11 1/2	33	33
5 3/4	33	33	12	33	33
6	33	33	12 1/2	33	33
6 1/4	33	33	13	33	33
6 1/2	33	33	13 1/2	33	33
6 3/4	33	33	14	33	33
7	33	33	14 1/2	33	33
7 1/4	33	33	15	33	33
7 1/2	33	33	15 1/2	33	33
7 3/4	33	33	16	33	33
8	33	33	16 1/2	33	33
8 1/4	33	33	17	33	33
8 1/2	33	33	17 1/2	33	33
8 3/4	33	33	18	33	33
9	33	33	18 1/2	33	33
9 1/4	33	33	19	33	33
9 1/2	33	33	19 1/2	33	33
9 3/4	33	33	20	33	33
10	33	33	20 1/2	33	33
10 1/4	33	33	21	33	33
10 1/2	33	33	21 1/2	33	33
10 3/4	33	33	22	33	33
11	33	33	22 1/2	33	33
11 1/4	33	33	23	33	33
11 1/2	33	33	23 1/2	33	33
11 3/4	33	33	24	33	33
12	33	33	24 1/2	33	33
12 1/4	33	33	25	33	33
12 1/2	33	33	25 1/2	33	33
12 3/4	33	33	26	33	33
13	33	33	26 1/2	33	33
13 1/4	33	33	27	33	33
13 1/2	33	33	27 1/2	33	33
13 3/4	33	33	28	33	33
14	33	33	28 1/2	33	33
14 1/4	33	33	29	33	33
14 1/2	33	33	29 1/2	33	33
14 3/4	33	33	30	33	33
15	33	33	30 1/2	33	33
15 1/4	33	33	31	33	33
15 1/2	33	33	31 1/2	33	33
15 3/4	33	33	32	33	33
16	33	33	32 1/2	33	33
16 1/4	33	33	33	33	33
16 1/2	33	33	33	33	33
16 3/4	33	33	33	33	33
17	33	33	33	33	33
17 1/4	33	33	33	33	33
17 1/2	33	33	33	33	33
17 3/4	33	33	33	33	33
18	33	33	33	33	33
18 1/4	33	33	33	33	33
18 1/2	33	33	33	33	33
18 3/4	33	33	33	33	33
19	33	33	33	33	33
19 1/4	33	33	33	33	33
19 1/2	33	33	33	33	33
19 3/4	33	33	33	33	33
20	33	33	33	33	33

Lap Weld

2 1/2	to 6.69	60 57	2 1/2	to 3 3/4	37	22 1/2
7 and 8	68	55	4 to 8	40	24 1/2	
11 and 12	66	56	9 to 12	38	24 1/2	
<i>Butt Weld, extra strong, plain ends</i>						
1/4	to 58	52 37	1/4	& +13	34	+45 1/2
1/4 to 58	58	45	1/4 & +2 1/2	34	34	34 1/2
3/4 to 63 1/2	54	59	3/4 & +3 1/2	37 1/2	37 1/2	37 1/2
1 to 3	70	62	1 to 2	43 1/2	29	29
<i>Lap Weld, extra strong, plain ends</i>						
2 1/2	to 6.69	60 57	2 1/2	to 4.45	40	26
7 and 8	68	55	4 to 8	45	33	33 1/2
5 and 10	67	57	7 to 8	46	30	30
11 and 12	66	56	9 to 12	41 1/2	33	33

Skelp	
(F.o.b. Pittsburgh or Youngstown)	
	Per Lb.
Grooved	1.40c.
Universal	1.40c.
Sheared	1.40c.

Wire Rods	
(Common soft, base)	
	Per Gross Ton
Pittsburgh	\$35.00
Cleveland	35.00
Chicago	35.00

COKE, COAL AND FUEL OIL

Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville	\$2.00 to \$2.25
Foundry, f.o.b. Connellsville	2.75 to 4.00
Foundry, by-product, Chicago	7.50
Foundry, by-product, delivered in Chicago switching district	8.25
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Philadelphia	8.50
Foundry, by-product, Cleveland, delivered	7.82
Foundry, Birmingham	8.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.10 to \$1.30
Mine run coking coal f.o.b. W. Pa. mines	1.40 to 1.50
Gas coal, 4-in. f.o.b. Pa. mines	1.30 to 1.40
Mine run gas coal, f.o.b. Pa. mines	1.30 to 1.40
Steam slack, f.o.b. W. Pa. mines	0.45 to 0.55
Gas slack, f.o.b. W. Pa. mines	0.65 to 0.75

Fuel Oil	
Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.25c.
No. 5 industrial fuel oil	2.85c. to 2.75c.
Per Gal. f.o.b. Cleveland	
No. 3 distillate	3.90c.
No. 4 industrial	4.50c.

REFRACTORIES

Fire Clay Brick	
	Per 1000 f.o.b. Works
High-heat Intermediate Duty Brick	
Pennsylvania	\$40.00
Maryland	40.00
New Jersey	38.00
Ohio	40.00
Kentucky	40.00
Missouri	35.00
Illinois	40.00
Ground fire clay, per ton	7.00

Chrome Brick	
	Per Net Ton
Standard size	\$42.50 to \$45.00

Silica Brick	
	Per 1000 f.o.b. Works
Pennsylvania	\$40.00
Chicago	49.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick	
	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	\$65.00
Unburned, f.o.b. Baltimore	53.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	\$13.40 to \$44.40
4-in. del'd Chicago	46.40 to 47.40
6-in. and larger, del'd New York	38.30
4-in. del'd New York	41.30
6-in. and larger, Birmingham	\$35.00 to \$40.00
4-in. Birmingham	38.00 to 39.00

Class "A" and gas pipe, \$3 extra.

Pig Iron, Ores, Ferroalloys

VALLEY

Per Gross ton f.o.b. Valley furnace:	
Basic	\$15.00
Bessemer	16.00
Gray forge	15.50
No. 2 foundry	15.50
No. 3 foundry	15.50
Malleable	15.50
Low phos., copper free	24.00

Freight rate to Pittsburgh or Cleveland district, \$1.85.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:	
Basic	\$15.50
No. 2 foundry	16.00
No. 3 foundry	15.50
Malleable	16.00
Bessemer	16.50

Freight rates to points in Pittsburgh district range from 69c. to \$1.26.

CHICAGO

Per gross ton at Chicago furnaces:	
N'th'n No. 2 fdy.	\$16.00
N'th'n No. 1 fdy.	16.50
Malleable, not over 2.25 sil.	16.00
High phosphorus	16.00
Lake Superior charcoal, sil. 1.50, by rail	23.17
Southern No. 3 fdy.	\$16.14 to 17.14
Low phos., sil. 1 to 2, Copper free	25.00
Silvery, sil. 8 per cent.	24.92
Best, ferro-sil'n, 15 per cent.	25.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:	
No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	\$16.00
Del'd St. Louis	16.85
Malleable, f.o.b. Granite City	16.50
Northern No. 2 fdy., del'd St. Louis	18.50
Northern malleable, del'd	18.50
Northern basic, del'd	18.30
Southern fdy., sil. 1.75 to 2.25 del'd St. Louis	16.35

Freight rates, 83c. (average) Granite City to St. Louis; \$2.30 from Chicago; \$4.56 from Birmingham.

NEW YORK

Per Gross ton, delivered New York district:	
*Buffalo, No. 2, del'd Eastern	\$17.41
N. J.	
Buffalo malleable, del'd Eastern	17.91
East Pa. No. 2 fdy.	17.92
East Pa. No. 2X fdy.	17.52

Freight rates: \$1.52 to \$2.63 from eastern Pennsylvania.
*Prices delivered to New Jersey cities naving rate of \$3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:	
No. 2 fdy.	\$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	14.00
Lake Superior charcoal, del'd	23.41

Per gross ton, delivered Cincinnati:	
Ala. fdy., sil. 1.75 to 2.25	\$16.51
Ala. fdy., sil. 2.25 to 2.75	16.76
Tenn. fdy., sil. 1.75 to 2.25	16.51
N'th'n No. 2 foundry	\$17.01 to 18.19
S'th'n Ohio silvery, 8%	21.39

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.82 from Birmingham.

CLEVELAND

Per gross ton at Cleveland furnace:	
N'th'n No. 2 fdy.	\$15.50
Malleable	15.50
Ohio silvery, 8 per cent.	23.00
Stand. low phos., Valley	23.00
Southern No. 2 fdy.	16.14

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 63c. average local switching charge; \$3.00 from Jackson, Ohio; \$6.14 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:	
East. Pa. No. 2	\$16.34
East. Pa. No. 2X	16.84
East. Pa. No. 1X	17.34
Basic (del'd east. Pa.)	16.09
Malleable	16.84
Stand. low phos. (f.o.b. east. Pa. furnace)	\$22.00 to \$23.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2	21.79
Va. No. 2X	22.29

Prices, except as specified otherwise, are del'd Philadelphia. Freight rates: 84c. to \$1.79 from eastern Pennsylvania furnaces; \$4.67 from Virginia furnaces.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnace:	
No. 2 fdy., 1.75 to 2.25 sil.	\$12.00
No. 2 soft, 2.25 to 2.75 sil.	12.50
Basic	12.00

NEW ENGLAND

Per gross ton delivered Boston and nearby New England points:	
Buffalo, sil. 1.75 to 2.25	\$18.53 to \$19.04
Buffalo, sil. 2.25 to 2.75	18.53 to 19.04
Ala., sil. 1.75 to 2.25	18.90 to 18.50

CANADA

Per gross ton:	
Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$22.60
No. 2 fdy., sil. 1.75 to 2.75	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	\$23.00 to 23.50

Ferromanganese

Per Gross Ton	
Domestic, 80%, seaboard	\$68.00 to \$72.00
Foreign, 80%, Atlantic or Gulf port, duty paid	68.00

The lower price applies to contracts for delivery to June 30, for spot shipment the price is \$72.

Spiegeleisen

Per Gross Ton Furnace	
Domestic, 19 to 21%	\$24.00

Electric Ferroalloy

Per Gross Ton Delivered	
50% (carloads)	\$74.50
55% (less carloads)	82.00
75% (carloads)	120.00
75% (less carloads)	130.00
14% to 16% (f.o.b.) Welland	
Ont. (in carloads)	31.00
14% to 16% (less carloads)	36.00

F.o.b. Jackson County, Ohio, or Pittsburgh Furnace

Per Gross Ton	Per Gross Ton
6%	\$19.00
7%	19.50
8%	20.00
9%	20.50
10%	21.00
11%	21.50
12%	22.00
13%	22.50
14%	23.00
15%	23.50
16%	24.00

Bessemer Ferroalloy
F.o.b. Jackson County, Ohio, or Pittsburgh Furnace

Per Gross Ton	Per Gross Ton
10%	\$21.50
11%	22.00
12%	22.50
13%	23.00

Manganese 1 1/2 to 3%, \$1 a ton additional. For each unit of manganese over 3%, \$1 a ton additional. Phosphorus 0.65% or over, \$1 a ton additional.

Other Ferroalloys

Ferrotungsten, per lb. wt. del. carloads	94c.
Ferrotungsten, less carloads	\$1.00
Ferromanganese, 4 to 6% and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	9.50c.

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$11.50 to \$12.00
No. 2 heavy melting steel	10.25 to 10.75
No. 3 railroad wrought	11.50 to 12.00
Scrap rails	11.50 to 12.00
Rails 3 ft. and under	12.50 to 13.00
Sheet bar crops, ordinary	12.00 to 12.50
Compressed sheet steel	11.50 to 12.00
Hand bundled sheet steel	10.00 to 10.50
Hvy. steel axle turnings	9.50 to 10.00
Machine shop turnings	8.25 to 8.75
Short shov. steel turnings	8.25 to 8.75
Short mixed borings and turnings	7.75 to 8.25
Cast iron borings	7.75 to 8.25
Cast iron car wheels	11.50 to 12.00
Heavy breakable cast	9.00 to 9.50
No. 1 cast	10.00 to 11.00
Railr. knuckles and couplers	13.00 to 14.00
Rail, coil and leaf springs	13.00 to 14.00
Rolled steel wheels	13.00 to 14.00
Low phos. billet crops	14.00 to 14.50
Low phos. sheet bar crops	13.50 to 14.00
Low phos. plate scrap	13.50 to 14.00
Low phos. punchings	13.50 to 14.00
Steel car axles	13.00 to 13.50

CHICAGO

Delivered Chicago district consumers:	
	Per Gross Ton
Heavy melting steel	\$9.00 to \$9.50
Shoveling steel	9.00 to 9.50

Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.05% carbon	20.00c. to 20.50c.
Ferrovanadium, del. per lb. contained Va.	\$2.60 to 2.90
Ferrocobalt, 15 to 18% per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads	18% Rockdale, Tenn., base, per gross ton with 32 unitage
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with 32.75 unitage	50.00
Ferromolybdenum, per lb. Mo., del.	55.00
Calcium molybdate, per lb. Mo., del.	80c.
Silico speigel, per ton, f.o.b. furnace, car lots	\$36.00
Ton lots or less, per ton	41.00
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	35.00
2% carbon grade	36.00
1% carbon grade	38.00
Spot prices	\$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.5% iron	\$4.80
Old range, non-Bessemer, 51.5% iron	4.65
Iron, basic or foundry, Swedish, average, 65% iron	4.65
Mesabi non-Bessemer, 51.5% iron	4.80
High phosphorus, 51.5% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 53 to 58% iron, dry Spanish or Algerian	7.50c.
Iron, low phos., Swedish, average 68% iron	8c.
Iron, basic or foundry, Swedish, average, 65% iron	7.50c.
Iron, basic or foundry, Russian, aver. 63% iron (nom.)	7.50c.
Manganese, Caucasian, washed 51% Mn.	18c.
Manganese, African, Indian, 50-52%	18c.
Manganese, Brazilian, 46 to 48%	16c.

Per Net Ton Unit

Tungsten, Chinese wolframite, duty paid	\$10.00
Tungsten, domestic scheelite	\$5.00 to \$10.00
Chrome, 45%, Cr2O3, crude, c.i.f. Atlantic seaboard	16.00
Chrome, 48%, Cr2O3, c.i.f. Atlantic seaboard	18.00

*Questions nominal in absence of sales.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines	\$10.50 to \$11.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	13.50
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	16.75
Domestic, No. 1 ground bulk, 85 to 98% silicon, f.o.b. Illinois and Kentucky mines	30.00

Hydraulic comp. sheets	\$7.75 to \$8.25
Drop forge flashings	6.25 to 6.75
No. 1 busheling	7.75 to 8.25
Rolled car wheels	9.50 to 10.00
Railroad tires	9.50 to 10.00
Railroad leaf springs	9.50 to 10.00
Axis turnings	7.75 to 8.25
Steel couplers and knuckles	9.50 to 10.00
Coil springs	10.50 to 11.00
Axis turnings (elec. fur.)	8.00 to 8.50
Low phos. punchings	9.50 to 10.00
Low phos. plates, 12 in. and under	9.50 to 10.00
Cast iron borings	5.50 to 6.00
Short shoveling turnings	5.50 to 6.00
Machine shop turnings	5.50 to 6.00
Retorling rails	10.00 to 10.50
Steel rails, less than 3 ft.	10.00 to 10.50
Steel rails, less than 2 ft.	11.00 to 11.50
Angle bars, steel	10.50 to 11.00
Cast iron car wheels	9.50 to 10.00
Railroad malleable	9.75 to 10.25
Agricultural malleable	7.50 to 8.

No. 2 busheling	\$4.00 to \$4.50
Locomotive tires, smooth	7.50 to 8.50
Pipe and flues	4.75 to 5.25
No. 1 machinery cast	8.75 to 9.25
Clean automobile cast	8.75 to 9.25
No. 1 railroad cast	8.50 to 9.00
No. 1 agricultural cast	8.00 to 8.50
Store plate	7.00 to 7.50
Grate bars	8.75 to 9.25
Brake shoes	8.50 to 9.00

PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$9.00 to \$9.50
No. 2 heavy melting steel	8.50
No. 1 railroad wrought	11.00
Bundled sheets	4.00 to 4.50
Hydraulic compressed, new	6.00
Hydraulic compressed, old	5.00
Machine shop turnings	6.00 to 6.50
Heavy axle turnings	7.50 to 8.00
Cast borings	5.50
Heavy breakable cast	9.50
Store plate (steel works)	7.00 to 7.50
No. 1 low phos. heavy	11.00 to 11.50
Couplers and knuckles	10.00 to 10.50
Roller steel wheels	10.00 to 10.50
No. 1 blast furnace	5.50
Spec. iron and steel pipe	8.00
Shafting	12.00 to 12.50
Steel axles	13.00 to 13.50
No. 1 forge fire	8.00 to 8.50
Cast iron car wheels	12.00 to 12.50
No. 1 cast	10.00 to 10.50
Cast borings (chem.)	10.00 to 10.50
Steel rails for rolling	9.50 to 10.00

CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$9.25 to \$9.50
No. 2 heavy melting steel	8.75 to 9.00
Compressed sheet steel	9.00 to 9.50
Light bundled sheet stamp-	6.50 to 7.00
Drop force flashings	8.00 to 8.50
Machine shop turnings	6.50 to 7.00
Short shoveling turnings	7.00 to 7.50
No. 1 busheling	7.50 to 8.00
Steel axle turnings	7.50 to 8.00
Low phos. billet cross	12.00 to 12.50
Cast iron borings	6.75 to 7.00
Mixed borings and short	6.75 to 7.00
turnings	6.75 to 7.00
No. 2 busheling	6.50 to 7.00
No. 1 cast	10.00 to 10.50
Railroad grate bars	8.50 to 9.00
Store plate	5.50 to 6.00
Roller steel wheels	8.50 to 9.00
Low phos. billet cross	12.00 to 12.50
Short shov. steel turn.	6.50 to 7.00
Short mixed borings and	6.00 to 6.50
turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
No. 2 busheling	6.00 to 6.50
Steel car axles	11.00 to 12.00
No. 1 machinery cast	10.50 to 11.00
No. 1 cupola cast	10.00 to 10.50
Store plate	8.00 to 8.50
Steel rails, 3 ft. and under	12.00 to 12.50
Cast iron car wheels	9.00 to 9.50
Industrial malleable	11.50 to 12.00
Railroad malleable	11.50 to 12.00
Chemical borings	7.50 to 8.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' yards:	
No. 1 heavy melting steel	\$10.00
Scrap steel	\$8.75 to 9.25
Scrap rails	8.75 to 9.25
New hydraulic comp. sheets	8.75 to 9.25
Old hydraulic comp. sheets	7.50 to 8.00
Drop force flashings	8.75 to 9.25
No. 1 busheling	8.75 to 9.25
Hvy. steel axle turnings	7.50 to 8.00
Machine shop turnings	4.25 to 4.50
Knuckles and couplers	11.00 to 11.50
Coil and leaf springs	11.00 to 11.50
Roller steel wheels	11.00 to 11.50
Low phos. billet cross	12.00 to 12.50
Short shov. steel turn.	6.50 to 7.00
Short mixed borings and	6.00 to 6.50
turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
No. 2 busheling	6.00 to 6.50
Steel car axles	11.00 to 12.00
No. 1 machinery cast	10.50 to 11.00
No. 1 cupola cast	10.00 to 10.50
Store plate	8.00 to 8.50
Steel rails, 3 ft. and under	12.00 to 12.50
Cast iron car wheels	9.00 to 9.50
Industrial malleable	11.50 to 12.00
Railroad malleable	11.50 to 12.00
Chemical borings	7.50 to 8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel	\$9.00 to \$9.50
Scrap steel	\$9.00 to \$9.50
Short shoveling turnings	6.50 to 7.00
Store plate	10.00 to 11.00
Iron axles	10.50 to 11.00
No. 1 railroad wrought	6.00
Rails for rolling	10.00 to 10.50
No. 1 cast	9.50 to 10.00
Tramcar wheels	9.00
Cast iron borings, chem.	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel	\$8.00 to \$8.50
No. 1 heavy melting	8.00 to 8.50
No. 2 heavy melting	7.50 to 8.00
No. 1 locomotive tire	6.00 to 6.50
Misc. stand.-sec. rails	9.00 to 9.50
Railroad springs	9.50 to 10.00
Bundled sheets	4.50 to 5.00
No. 2 railroad wrought	8.00 to 8.50
No. 1 busheling	3.50 to 4.00
Cast iron borings and	3.00 to 3.50
shoveling turnings	3.00 to 3.50
Rails for rolling	9.50 to 10.00
Machine shop turnings	3.00 to 3.50
Heavy turnings	4.00 to 4.50
Steel car axles	9.50 to 10.00
Iron car axles	11.50 to 12.00
Wrot. iron bars and trans.	8.00 to 8.50
No. 1 railroad wrought	6.00 to 6.50
Steel rails less than 3 ft.	10.00 to 10.50
Steel angle bars	9.00 to 9.50
Cast iron car wheels	8.00 to 8.50
No. 1 machinery cast	10.50 to 11.00
Railroad malleable	8.00 to 8.50
No. 1 railroad cast	8.00 to 8.50
Store plate	7.00 to 7.50
Relay rails, 60 lb. and	16.00 to 16.50
under	16.00 to 16.50

Relay rails, 60 lb. and	\$20.00 to \$21.00
over	20.00 to 21.00
Agricult. malleable	6.00 to 6.50

BOSTON

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$5.50 to \$5.75
Scrap T rails	4.75 to 5.00
Machine shop turnings	2.00 to 2.25
Cast iron borings	2.00 to 2.25
Bundled skeleton, long	3.00 to 3.25
Forge flashings	3.00 to 3.25
Blast furnace scrap	1.75 to 2.00
Shafting	7.50 to 8.00
Steel car axles	8.00 to 8.50
Wrought pipe	2.25 to 2.50
Rails for rolling	6.00 to 6.50
Cast iron borings, chemical	7.25 to 7.75

Per gross ton delivered consumers' yards:	
Textile cast	\$7.00 to \$7.50
No. 1 machinery cast	7.00 to 7.50
Store plate	4.25 to 4.50
Railroad malleable	8.50 to 9.50

NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$6.00 to \$6.50
No. 2 heavy melting steel	5.00 to 5.25
Heavy melting steel (yard)	2.50 to 3.00
No. 1 heavy breakable cast	5.00 to 5.50
Store plate (steel works)	4.00 to 4.50
Machine shop turnings	3.00
Short shoveling turnings	2.50 to 3.00
Cast borings	2.50 to 3.00
No. 1 blast furnace	3.00 to 3.50
Steel car axles	9.50 to 10.00

Spec. iron and steel pipe	\$3.50
Forge fire	4.25
No. 1 railroad wrought	\$5.00 to 5.50
No. 1 yard wrought long	3.50 to 3.75
Rails for rolling	6.25 to 6.75
No. 1 cast	6.00 to 6.50
No. 2 cast	5.50 to 6.00
Store plate (foundry)	3.50
Cast borings (chemical)	6.00 to 6.50

Per gross ton, delivered local foundries:

No. 1 machinery cast	\$9.00
No. 1 hvy. cast (cupola size)	7.50 to 8.00
No. 2 cast	6.00 to 6.50

CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel	\$7.50 to \$8.00
Scrap rails for melting	3.00 to 3.50
Loose sheet clippings	3.00 to 3.50
Bundled sheets	4.50 to 5.00
Cast iron borings	4.25 to 4.75
Machine shop turnings	3.75 to 4.25
No. 1 busheling	5.25 to 5.75
No. 2 busheling	2.75 to 3.25
Rails for rolling	8.50 to 9.00
No. 1 locomotive tires	7.50 to 8.00
Short rails	10.50 to 11.00
Cast iron car wheels	7.25 to 7.75
No. 1 machinery cast	7.75 to 8.25
No. 1 railroad cast	7.25 to 7.75
Burnt cast	5.25 to 5.75
Store plate	5.25 to 5.75
Agricultural malleable	7.75 to 8.25
Railroad malleable	8.00 to 8.50

DETROIT

Dealers' buying prices per gross ton:	
Hvy. melting steel	\$7.50 to \$8.00
Borings and short turnings	5.50 to 6.00
Long turnings	4.50 to 5.00
No. 1 machinery cast	8.50 to 9.00
Automotive cast	19.00 to 19.50
Hydraulic comp. sheets	7.50 to 8.00
Store plate	4.50 to 5.00
New No. 1 busheling	4.50 to 5.00
Old No. 2 busheling	4.50 to 5.00
Sheet clippings	4.50 to 5.00
Flashings	5.50 to 6.00

CANADA

Dealers' buying prices per gross ton:	
Toronto Montreal	
Heavy melting steel	\$4.50 \$4.50
Rails, scrap	4.50 4.50
Machine shop turnings	2.00 2.00
Boiler plate	4.50 4.50
Heavy axle turnings	2.50 2.50
Cast borings	2.00 2.00
Steel borings	2.00 2.00
Wrought pipe	3.50 3.50
Steel axles	4.50 4.50
Axles, wrought iron	4.50 4.50
No. 1 machinery cast	7.75 9.00
Store plate	4.50 5.00
Standard car wheels	7.25 7.00
Malleable	6.75 7.00

Warehouse Prices for Steel Products

PITTSBURGH

Base per lb.	
Plates	2.85c
Structural shapes	2.85c
Soft steel bars and small shapes	2.60c
Reinforcing steel bars	2.60c
Cold-finished and screw stock	2.95c
Rounds and hexagons	2.95c
Squares and flats	2.95c
Hoops and bands, under 1/4 in.	2.95c
Hot-rolled annealed sheets (No. 24)	3.10c
Galv. sheets (No. 24), 28 or more	3.60c
bundles	3.60c
Hot-rolled sheets (No. 10) 2.60c to 2.90c	
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	\$3.61
Spikes, large	2.40c
Small	2.60c
Boat	2.90c
Track bolts, all sizes, per 100 count	70 per cent off list.
Machine bolts, 100 count	70 per cent off list.
Carriage bolts, 100 count	70 per cent off list.
Nuts, all styles, 100 count	70 per cent off list.
Large rivets, base per 100 lb.	\$3.00
Wire, black, soft ann'd, base per 100 lb.	3.15
Wire, galv. soft, base per 100 lb.	2.80
Common wire nails, per keg	2.20
Cement coated nails, per kg.	2.20

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO

Base per lb.	
Plates and structural shapes	3.00c
Soft steel bars	2.75c
Reinforc. bars, billet steel	1.90c
Rail steel reinforcement	1.50c to 1.65c
Cold-finish steel bars and shafting	3.00c
Rounds and hexagons	3.00c
Flats and squares	3.50c
Bands, 3/16 in. (in Nos. 10 and 12 gauge)	2.95c
Hoops (No. 14 gauge and lighter)	3.50c
Hot-rolled annealed sheets (No. 24)	3.45c
Galv. sheets (No. 24)	3.85c
Hot-rolled sheets (No. 10)	2.75c
Spikes (3/16 in. and lighter)	3.45c
Track bolts	4.00c
Rivets, structural (keg lots)	2.75c
Rivets, boiler (keg lots)	2.75c
Per Cent Off List	
Machine bolts	65
Carriage bolts	65
Coach and lag screws	65
Hot-pressed nuts, sq., tap. or blank	65
Hot-pressed nuts, hex., tap. or blank	65
Hex. head cap screws	80 and 10
Cup point set screws	75
Flat head bright wood screws	50 and 10
Spring cotter pins	60 and 10
Store bolts	80
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	\$4.50 off list
No. 8 black ann'd wire, per 100 lb.	\$3.45
Com. wire nails, base per keg	2.30
Cement c'd'd nails, base per keg	2.30

NEW YORK

Base per lb.	
Plates and struc. shapes	3.10c
Soft steel bars, small shapes	3.10c
Iron bars	3.24c
Iron bars, cold charcoal	3.75c to 3.90c
Cold-fin. shafting and screw stock	3.25c
Rounds and hexagons	3.54c
Flats and squares	4.04c
Cold-roll. strip, soft and quarter hard	4.95c
Hoops	3.60c
Bands	3.30c
Hot-rolled sheets (No. 10)	2.60c
Hot-rolled ann'd sheets (No. 24)	3.25c
Galvanized sheets (No. 24)	3.50c
Long term sheets (No. 24)	4.50c
Standard tool steel	12.00c
Wire, black annealed (No. 10)	3.60c
Wire, galv. annealed (No. 10)	4.05c
Tire steel 1/4 x 1/4 in. and larger	3.40c
Smooth finish, 1 to 3/4 x 1/4 in. and larger	3.75c

Open hearth spring steel, bases	4.50c to 7.00c
Common wire nails, base, per keg	\$2.65
Machine bolt, cut thread:	
1/4 x 6 in. and smaller	65 to 65 and 10
1/2 x 10 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
1/4 x 6 in. and smaller	65 to 65 and 10
1/2 x 10 in. and smaller	65 to 65 and 10
Boiler tubes:	
Lap welded, 2-in.	\$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

Base per lb.	
Plates and struc. shapes	3.25c
Soft steel or iron	3.00c
Cold-fin. rounds, shafting, screw stock	3.34c
Hot-rolled annealed sheets (No. 24)	3.60c
Galv. sheets (No. 24)	4.00c
Hot-rolled sheets (No. 10)	3.00c
Black corrug. sheets (No. 24)	3.65c
Galv. corrug. sheets	4.05c
Structural rivets	3.00c
Boiler rivets	3.00c
Per Cent Off List	
Tank rivets, 7/16 in. and smaller	70
100 lb. or more	70
Machine bolts, 100 lb.	65
Carriage bolts	65
Lag screws	65
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	65
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	65
Less than 200 lb.	65

PHILADELPHIA

Base per lb.	
*Plates, 1/4-in. and heavier	2.45c
*Structural shapes	2.45c
*Soft steel bars, small shapes, iron bars (except bands)	2.45c
Reinforc. steel bars, sq., twisted and deformed	2.39c
Cold-finished steel bars	3.35c
*Steel hoops	3.00c
*Steel bands, No. 12 to 3/16 in. incl.	2.75c
Sliding steel	3.00c
*Hot-rolled annealed sheets (No. 24)	3.15c
*Galvanized sheets (No. 24)	3.50c
*Hot-rolled annealed sheets (No. 10)	2.70c
Diam. pat. floor plates, 1/4 in.	3.00c
Swedish iron bars	3.60c

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.
*Base prices subject to deductions on orders aggregating 4000 lb. or over.
†For 50 bundles or over.

CLEVELAND

Base per lb.	
Plates and struc. shapes	2.95c
Soft steel bars	2.75c
Reinforc. steel bars	1.75c to 2.35c
Flat rolled steel under 1/4 in.	2.90c
Cold-finished strip	3.55c
Hot-rolled annealed sheets (No. 24)	3.25c
Galvanized sheets (No. 24)	3.50c
Hot-rolled sheets (No. 10)	3.00c
Black ann'd wire, per 100 lb.	\$2.55

PLANT EXPANSION AND EQUIPMENT BUYING

◀ NEW ENGLAND ▶

Aetna Brewing Co., Hartford, Conn., has approved plans for two-story addition for new mechanical bottling unit, for capacity of about 11,000 bottles an hour, and will also carry out other improvements and expansion. Company has arranged for stock issue totaling about \$218,000, part of proceeds to be used for purpose noted.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 5 for 1160 copper nickel alloy forgings (Schedule 231) for Newport, R. I., Navy Yard.

Henkle Brewery, Mill and Winthrop Streets, New London, Conn., inactive for many years, has been acquired from E. A. Henkle, New London, by new interests, headed by Harry Steinfeld. Company will be organized to operate plant. Plans are under way for extensions and modernization, including equipment. Cost over \$85,000 with machinery.

All-Metal Die Co., Newton, Mass., has been organized by Charles F. Williams, 156 Oak Street, and associates, to manufacture steel and other metal dies and kindred products.

Hartford Brewing Co., Hartford, H. L. Pierce, 650 Main Street, president, recently organized, has engaged Ebbets & Frid, 15 Lewis Street, architects, to draw plans for remodeling and extending property lately acquired on Pope Park Road, including one-story addition, 75 x 140 ft., for mechanical bottling unit. Cost about \$500,000 with equipment.

Boston Envelope Co., 315 Center Street, Jamaica Plain, Boston, has asked bids on general contract for new three-story and basement paper converting mill at East Dedham, Mass. Cost over \$50,000 with equipment. Harold Duffie, 364 Belgrade Avenue, West Roxbury, Mass., is architect.

◀ CENTRAL DISTRICT ▶

Pittsburgh Plate Glass Co., Grant Building, Pittsburgh, has plans for new three-story plant at Los Angeles, for paint and varnish division. Cost close to \$100,000 with machinery.

Hyde Park Brewing Co., Hyde Park, Westmoreland County, Pa., plans remodeling and modernization program, including equipment. Cost over \$70,000 with machinery. R. J. Brocker, Coulter Building, Greensburg, Pa., is architect.

Joseph S. Finch & Co., Inc., Clark Building, Pittsburgh, distiller, has awarded general contract to Rust Engineering Co., Koppers Building, for second addition to distillery at Schenley, Pa., nine-stories, 133 x 146 ft., for storage and distribution. Cost about \$80,000 with machinery. Work on first unit, for which general contract was recently let to same company, will be placed under way at once, including two-story and basement mechanical bottling works. Cost \$100,000 with equipment. Bids are being asked for erection of a third unit. Carl J. Kiefer, Schmidt Building, Cincinnati, is consulting engineer.

Bureau of Water, City-County Building, Pittsburgh, plans installation of new steel tank, to replace present unit in Allentown district, pumping equipment, pipe lines, etc., for extensions and improvements in water system. Bond issue of \$100,000 has been arranged.

Master Metals, Inc., 6713 Morgan Avenue, Cleveland, recently organized as an affiliation of National Lead Co., 111 Broadway, New York, to take over metal alloy division of Master Builders' Co., East Seventy-first Street and Euclid Avenue, Cleveland, has let general contract to Cleveland Service Co., St. Clair Avenue and East Fortieth Street, for one-story, plant, 75 x 100 ft., with two smaller adjoining units, 20 x 95 ft., and 21 x 40 ft., respectively. Cost about \$40,000 with equipment. S. W. Flesheim is vice-president and general manager.

Foster Stove Co., Ironton, Ohio, manufacturer of stoves, ranges, etc., is considering one-story addition. Cost about \$25,000 with equipment.

Libbey-Owens-Ford Glass Co., Nicholas Building, Toledo, Ohio, manufacturer of sheet and shatterproof glass products, has approved plans for addition to increase output of shatterproof glass about 25 per cent. Cost close to \$100,000 with machinery.

City Council, Delphos, Ohio, plans electrification of municipal waterworks and installation of new pumping and other equipment. Cost about \$50,000 with machinery.

Akron Brewing Co., South Forge and Hill Streets, Akron, Ohio, has taken bids on general contract for one and two-story plant unit, including improvements in present brewery. Cost about \$100,000 with equipment. Wilbur Watson & Associates, 4614 Prospect Avenue, Cleveland, are architects.

Dayton Rubber Mfg. Co., 2345 West River-view Avenue, Dayton, Ohio, manufacturer of automobile tires, etc., has let general contract to Henry Stock & Son, 55 Brandt Street, for one-story L-shaped addition, 40 x 200 ft. and 40 x 100 ft. for storage and distribution. Cost about \$35,000 with equipment. Geyer & Neuffer, Ludlow Arcade Building, are architects.

Scientific Instruments, Inc., Fort Wayne, Ind., has been organized by Emmett J. Culligan, Fort Wayne, and associates, to manufacture technical and surgical instruments.

Midwest Brewery Co., 48 Fidelity Trust Building, Indianapolis, recently organized, has taken over former plant of Capitol City Brewing Co., 1254 South West Street, and will remodel and install new equipment. Cost over \$60,000 with machinery. N. E. Elliott is president.

Goebel Brewing Co., Rivard and Maple Streets, Detroit, will make extensions and improvements, with installation of new equipment. Cost over \$75,000 with machinery. Harley & Ellington, Inc., Stroh Building, is architect.

Muskegon Brewing Co., Muskegon, Mich., plans early rebuilding of part of plant recently destroyed by fire. Loss about \$100,000 with equipment.

Jaeger Motor Car, Inc., Cass City, Mich., recently organized by Charles Jaeger, Cass City, and associates to manufacture Jaeger car, an assembled automobile, has leased property from Village Council and will equip for initial output of about 10 cars daily. Ashton Johnson will head engineering department.

S. R. Dresser Mfg. Co., Bradford, Pa., manufacturer of pipe couplings, has acquired Bryant Heater & Mfg. Co., Cleveland, manufacturer of gas boilers. F. A. Miller, chairman, and H. N. Mallon, president of Dresser company, will also act as chairman and president of Bryant company.

◀ SOUTH CENTRAL ▶

Lexington Gas Appliance Co., Lexington, Ky., recently organized by C. H. Jett, 510 West Third Street, and Drayton Mayers, has leased part of building at 336 West Main Street, for manufacture of gas appliances and equipment.

Town Council, Red Bay, Ala., plans installation of pumping plant, 50,000 gal. capacity elevated steel tank and tower, pipe lines, etc., for new water supply system. Fund of \$55,000 has been secured for project.

Cedar Grove Refining Co., Shreveport, La., is planning new oil refinery at Jackson, Miss., primarily for gasoline production. Cost over \$90,000 with equipment. R. A. Billups, Greenwood, Miss., is interested in project.

City Council, Sheffield, Ala., has authorized bond issue of \$150,000 for municipal electric light and power plant.

American Medical Spirits Co., Bernheim Lane, Louisville, will carry out expansion and improvements in Sunnybrook distillery, in connection with addition, 100 x 300 ft., recently referred to in these columns, including one-story machine shop, power house and other mechanical units. Cost over \$200,000 with equipment. Leslie V. Abbott, 8 Linwood Boulevard, is architect.

Memphis Brewing Co., Memphis, Tenn., C. M. Bishop, 162 Madison Avenue, head, formerly known as Tennessee Brewing Co., will take bids in about 60 days for extensions and improvements in local factory for new brewery. Cost about \$175,000 with machinery.

Common Council, Dothan, Ala., plans extensions and improvements in municipal electric light and water plant, with installation of Diesel engines and other equipment. Cost over \$50,000 with machinery.

◀ NORTH ATLANTIC ▶

Flanagan-Nay Brewing Corp., New York, recently organized by Major Thomas G. Lanphier and associates, has taken over plant of Phoenix Cereal Beverage Co., Tenth Avenue and Twenty-sixth Street, and will modernize for new brewery.

Porcelain Metals, Inc., 58 Sedgwick Street, Brooklyn, manufacturer of enameled metal products, will take bids in about 60 days for new one-story plant. Cost over \$25,000 with equipment. Horace Ginsberg, 205 East Forty-second Street, New York, is architect.

Standard Oil Co. of New Jersey, 26 Broadway, New York, will carry out expansion and improvements at refinery at Baton Rouge, La., including new absorption unit and other equipment for gasoline production. Cost over \$100,000 with machinery.

D. & R. Structural Steel & Ornamental Works, Inc., Bronx, New York, has been organized by Louis Driben, 135 West 175th Street, and Isidore Romm, 630 Manida Street, to manufacture steel and ornamental iron products. New company will take over D. & R. Iron Works, 1152 East 156th Street.

Pan-American Petroleum & Transport Co., 122 East Forty-second Street, New York, is arranging for purchase of crude oil producing properties in Texas, near new refinery to be erected at Texas City, recently referred to in these columns, and will develop for oil supply for such plant, with installation of pumping machinery, gathering pipe line system and main pipe line to refinery. Cost over \$1,000,000.

Edward & John Burke, Ltd., 47-24 Twenty-fourth Street, Long Island City, brewer, has secured permit for two new plant units, one three-stories, 95 x 151 ft., for brewing and bottling departments, and one one-story, 67 x 120 ft., for storage and distribution. Cost \$200,000 with machinery. W. S. Kinnear & Co., 50 Church Street, New York, are engineers.

Suburban Oil Co., Mount Vernon, N. Y., care of J. Henry Esser, Mount Vernon, former corporation counsel, recently organized by Mr. Esser and associates, plans new oil refinery, with storage and distribution units on Eastchester Creek. Property is being leased from city. Cost over \$100,000 with equipment.

Chevrolet Motor Co., Tarrytown, N. Y., has advanced production to maximum at branch assembling works, with similar schedule at adjoining plant of Fisher Body Co., affiliated organization. Both plants are employing about 3000 men, as compared with one-third this number on part time three months ago. Pontiac Motor Co., Pontiac, Mich., another allied interest, is opening a new local assembling plant, including parts division.

P. Ballantine & Sons, 57 Freeman Street, Newark, brewers, have been acquired by new interests, headed by Carl W. Badenhausen, Short Hills, N. J., and associates. New owner plans extensions and improvements, with installation of tanks, mechanical bottling and other equipment. Cost over \$75,000. Gilbert R. Potts, heretofore president, will continue in that capacity. Mr. Badenhausen is vice-president.

J. F. Trommer, Inc., 1632 Bushwick Avenue, Brooklyn, brewer, let contract to C. F. Coyne, 500 Linden Place, Orange, N. J., for extensions and improvements in former plant of Orange Brewery, Orange; other contracts also let for roofing and miscellaneous construction. Equipment will be installed for brewing, bottling, mechanical-cooling, etc.; power house will be remodeled and oil fuel equipment installed. Cost about \$400,000.

Stumpff Co., Inc., Newark, has been organized by Charles Stumpff, 53 Wainwright Street, and associates, to manufacture cutlery, tools and kindred products.

Verdi Brothers Cooperage Co., 68 Hudson Street, Hoboken, N. J., manufacturer of wire-bound barrels, kegs, etc., has let general contract to Bonanno Brothers, North Bergen, N. J., for new one-story plant, including one-story power house, on 6-acre tract at North Bergen, recently acquired. Cost about \$75,000 with equipment. Present works will be removed to new location. Frederick W. Fisher, 1248 Bloomfield Avenue, Hoboken, is architect.

Scholler Brothers, Inc., Ambler and Westmoreland Streets, Philadelphia, manufacturer of soaps, etc., has awarded general contract to

"THANKS TO YOU...OUR



An interview with Mr. S. E. Summerfield, President of Gotham Silk Hosiery Co., Inc., Makers of Gotham Gold Stripe Silk Stockings

Q. Mr. Summerfield, you make 19 styles of Gotham stockings in 6 sizes and put out 16 colors, a total of 1824 different units. How do you manage it?

A. Sales records regulate style production, and modern all-Monel Metal dyeing machines make our 24 hour delivery service possible.

Q. Monel Metal?

A. Gotham Gold Stripe merchants are always sending in rush orders for a wide variety of different colors. And always want 'em over night. So we often have to dye big batches of stockings promptly or we couldn't fill our

orders. Monel Metal seems to have been made for our dyeing machines. Its polished surfaces haven't harmed the delicate fabric of our sheerest stockings once in the 15 years we have used it. Besides, it's a big time-saver...We can change over quickly from one color to another because Monel Metal is not affected by the dye and it's easily cleaned. Just a matter of minutes.

Q. Doesn't that kind of service cost a lot of money?

A. Plenty...but it costs only one-third as much as dyeing with our former old-fashioned equipment. And so we're able, even with today's demand for speed, to give the public much better stockings than would be possible if it weren't for Monel Metal.

Stockings

KEEP A

Step Ahead

OF THE STYLE!"



Monel Metal helps many another industry to speed processes and cut costs. It brings to many a home cleanliness and beauty. Its silvery sheen, cleanliness, great strength, toughness, corrosion-resistance and immunity to rust are ideal qualities for kitchen sinks and cabinet tops, table and range tops and hot water tanks.

You find Monel Metal used in industry for food handling equipment of every kind, in hotels, restaurants and hospitals; in canneries and packing plants; for machinery of all sorts in laundries, chemical and power plants...in fact, most industries appreciate that no other metal has its unique combination of qualities.

The chances are that there are valuable but undiscovered uses for it in your own business. Drop us a line and let us tell you how others in your particular field have taken advantage of Monel Metal.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

MONEL METAL



Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

W. F. Lotz, Frankford Avenue and Oxford Pike, for one-story addition. Cost over \$75,000 with equipment. D. E. Nuber, Oxford Bank Building, Oxford Pike, is architect.

Hopewell Candy Co., Hopewell, Mercer County, N. J., plant has been acquired by new interests, headed by Joseph Anasti and associates, who are organizing a brewing company. Factory has been idle for several years and will be remodeled and equipment installed for brewing, bottling, mechanical-cooling and other service. Cost over \$80,000 with machinery.

Jeddo Highland Coal Co., Jeddo, Pa., has asked bids on general contract for new electric power plant at local properties. Cost over \$45,000 with equipment. H. M. Wilson Co., Eighteenth and Brandywine Streets, Philadelphia, is consulting engineer.

Borough Council, West Chester, Pa., plans installation of pumping machinery and other equipment, pipe lines, etc., in connection with extensions in municipal waterworks in West Goshen district. Cost about \$75,000 with machinery. I. S. Walter, West Chester, is consulting engineer.

Iroquois Beverage Corp., 230 Pratt Street, Buffalo, has filed plans for addition to brewing plant. Cost over \$35,000 with equipment.

Buffalo Metal Furniture Mfg. Co., Inc., Buffalo, has been organized under direction of George D. Smith, Genesee Building, to manufacture metal furniture and fixtures. Company will take over organization of same name at 1511 Niagara Street.

Noble & Wood Machine Co., Hoosick Falls, N. Y., manufacturer of paper-making machinery, parts, etc., has arranged for increase in capital from \$150,000 to \$225,000 for general expansion.

◀ MIDDLE WEST ▶

Hoffmann Brothers Brewery, Monroe and Rockwell Streets, Chicago, has been acquired by new interests, headed by Frank Fox of Peter Fox Sons Co., 1122 Fulton Market, commission merchant. Extensions and improvements will be made, including equipment. Cost about \$100,000 with machinery. New company is being organized to operate plant.

United States Gypsum Co., 300 West Adams Street, Chicago, manufacturer of building materials, roofing products, etc., has acquired plant and business of McHenry-Millhouse Mfg. Co., South Bend, Ind., manufacturer of roofing products, and will expand for branch plant.

Regal Metal Products Co., 114 Fayette Street, Peoria, Ill., has been organized, capital \$75,000, by E. N. Woodruff and J. P. Gobberdiel, to manufacture metal goods.

City Council, Ely, Minn., plans new municipal steam power plant and system for central heating service. Cost over \$300,000 with equipment, pipe lines, etc. Joseph Veranth is city engineer.

Sprague Foundry & Mfg. Co., 230 South Eleventh Street, Council Bluffs, Iowa, manufacturer of iron castings, etc., plans new one-story foundry to replace unit recently destroyed by fire.

Mid-West Bottle Cap Co., Belvidere, Ill., has awarded general contract to Reichenbach Construction Co., North Winnebago Street, Rockford, Ill., for one-story addition, 50 x 116 ft. A one-story office building, 42 x 87 ft., will also be erected. Cost about \$40,000 with equipment. Peterson & Johnson, Swedish-American Bank Building, Rockford, are architects.

Missoula Brewing Co., Missoula, Mont., William Steimbrenner, general manager, let general contract to Elliott Construction Co., Missoula, for one-story and basement addition for mechanical bottling, 60 x 95 ft. Cost about \$45,000 with equipment. H. E. Kirkemo, Missoula, is architect.

Chicago Carton Co., 4433 Ogden Avenue, Chicago, manufacturer of corrugated and other paper boxes and containers, has let general contract to Poirot Construction Co., 38 South Dearborn Street, for two-story and basement plant, 260 x 500 ft. Cost over \$300,000 with equipment. A. Epstein, 2001 West Pershing Road, is architect and engineer.

Tavern Cabinet & Fixture Co., 159 North Racine Avenue, Chicago, has been organized by Harry and Max Wald and William A. Madaus, to manufacture metal fixtures.

Pressed Steel Tank Co., Milwaukee, is arranging for immediate duplication of its manufacturing facilities to double production of Hackney metal beer barrels. Orders have been received from more than 100 breweries.

Claffey Casting Co., Inc., Waukesha, Wis., has been organized to take over plant of de-

funct I. B. Rowell Mfg. Co., Waukesha, and will modernize as jobbing foundry, specializing in light and medium weight gray iron and alloy iron castings. B. D. Claffey, for 13 years associated with Spring City Foundry Co., Waukesha, and Milwaukee Gray Iron Foundry Co., West Allis, is president and general manager.

City Council, Milwaukee, has authorized construction of municipal filtration plant costing \$4,500,000 if and when Reconstruction Finance Corp. authorizes self-liquidating loan of full amount. Roland E. Stoelting is commissioner of public works.

Stock Brewing Co., Inc., Milwaukee, has been organized by Harvey J. Stock, 1914 North Prospect Avenue; A. C. Barrett and C. H. Braun, and will establish brewery in leased quarters in Pfister & Vogel industrial group at South Sixth and West Virginia Streets. Investment will be upward of \$60,000.

Whitnall Engineering Co., Janesville, Wis., has been incorporated by Jesse B. Whitnall and sons, John T., and Edward F. Whitnall, to manufacture stationary and portable conveyors and other industrial and contractors' equipment.

◀ SOUTHWEST ▶

Board of Public Utilities, 805 North Sixth Street, Kansas City, Kan., C. A. Lowder, secretary, has authorized plans for first section of municipal electric light and power underground transmission system. Cost about \$175,000. Plans for other sections will be prepared later. Total cost \$500,000 with equipment. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Hyde Park Breweries Association, Inc., St. Louis, care of Henry Nicolaus, 4998 Quincy Street, recently organized by Mr. Nicolaus and associates, capital \$2,000,000, has purchased from St. Louis Brewing Association, 2018 Chouteau Street, its Hyde Park, Lafayette and Wainwright brewing plants and will consolidate under first noted name. Expansion and improvements will be made in three plants, including installation of equipment. Cost about \$450,000 with machinery. E. G. Burkham, St. Louis, is interested in new company.

Common Council, Checotah, Okla., plans installation of pumping machinery, filtration equipment, pipe lines, etc., for extensions and improvements in municipal waterworks. Cost about \$80,000 with machinery. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Charlier Mfg. Co., Inc., St. Louis, has been organized by G. J. Charlier, 1421 Semple Street, to manufacture motor boats and parts. E. R. Mueller, St. Louis, is interested in new company.

Clarion Oil Co., Esperson Building, Houston, Tex., J. C. McCallip, president, plans extensions and improvements in bulk oil storage and distributing terminal, including tanks and other equipment. Cost about \$85,000 with equipment.

Welded Tank & Steel Co., Dallas, Tex., has been organized by D. E. Humphrey, 6850 Gaston Street, and associates, to manufacture welded steel tanks and kindred products.

Sherman Corp., St. Louis, has been organized by Samuel I. Sievers, 952 Boatmen's Bank Building, city, and A. L. Sherman, Alton, Ill., to manufacture signal lights and signaling devices and equipment.

Dallas Pump & Valve Co., Dallas, Tex., has been organized by W. A. Taylor, 1801 St. Louis Street, and associates, to manufacture pumping machinery and other mechanical equipment.

◀ SOUTH ATLANTIC ▶

National Brewing Co., Conklin and O'Donnell Streets, Baltimore, has awarded general contract to George L. Schnader, 4752 Park Heights Avenue, for one-story top addition, 70 x 75 ft. Cost about \$27,000 with equipment.

Winter Haven Utilities Corp., Winter Haven, Fla., recently organized by C. H. Thompson, Winter Haven, and associates, plans erection of electric light and power plant, and system for local service. Cost over \$75,000 with equipment.

South Florida Brewery Co., Tampa, Fla., recently organized with capital of \$300,000 by Thomas L. Swift, 73 East Elm Street, Chicago, and Albert G. Wright, Tampa, has acquired property at Pierce and Zack Streets, and will remodel for new plant. Cost over \$200,000 with equipment.

General Purchasing Officer, Panama Canal, Washington, asks bids until July 10 for one rock crusher, shovels, monkey wrenches, Stillson wrenches, copper wire cloth, drills, nuts, barrel bolts, cable clips, chain shackles, assorted files, tinner's snips, wire brushes, etc. (Schedule 2880).

Bauernschmidt Brewing Corp., Baltimore, John G. Bauernschmidt, 418 South Augusta Avenue, head, recently organized by Mr. Bauernschmidt and associates, has acquired property bounded by Willard, Hollins, McHenry and Warminster Streets, and will remodel for new plant. Cost about \$75,000 with machinery.

Common Council, Waldo, Fla., plans extensions and improvements in municipal waterworks and will purchase electric-operated pumping machinery, 10,000-gal. elevated tank, pipe lines and other equipment. Cost about \$75,000. N. R. Hicks, clerk, in charge.

Procurement Division, Veterans' Administration, Washington, asks bids until July 6 for one elevating or lift truck (Proposal 680-M); one trench pump (Proposal 572-M).

Shell Eastern Petroleum Products Corp., First National Bank Building, Charlotte, N. C., C. E. Smith, division manager, plans bulk oil storage and distributing plant. Cost about \$25,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 5 for eight 5-ton chain hoists, three 3 tons, three 1-ton, and eight 2000-lb. (Schedule 280), draft gages and spare parts (Schedule 293), 24 electric motor and speed reducer units and spare parts (Schedule 283); until July 11, six motor-driven engine lathes and spare parts (Schedule 285), all for Boston, Brooklyn, Philadelphia and Puget Sound yards; carbon steel twist drills (Schedule 317) for Eastern and Western yards; until July 5, 144 all-metal vacuum bottles (Schedule 302) for Brooklyn yard.

◀ PACIFIC COAST ▶

Bear State Brewing Co., San Bernardino, Cal., Benjamin F. Jacobs, president, recently organized by Mr. Jacobs and associates, has taken over building at G Street and Rialto Avenue for new plant. Cost over \$50,000 with machinery.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 5 for 3000 lb. corrosion resisting steel tubing (Schedule 269) for Puget Sound Navy Yard; 100,000 lb. medium bar rivet steel (Schedule 279) for Mare Island yard.

Phoenix Carbonic Ice Corp., 131 West Jefferson Street, Phoenix, Ariz., plans new dry ice-manufacturing plant, including one-story carbonic gas-manufacturing unit. Cost over \$50,000 with equipment. James M. Palmer is president.

Ace Furnace & Sheet Metal Works, 3740 South Union Avenue, Tacoma, Wash., has authorized plans for one-story addition. Silas E. Nelsen, Tacoma, is architect.

Capitol Brewing Co., Thirtieth and Q Streets, Sacramento, Cal., recently organized by S. E. Watson and E. J. Blossom, both Marysville, Cal., plans remodeling and improvements in building at location noted, with installation of equipment. Cost over \$75,000 with machinery.

Automatic Rotary Transmission Co., Los Angeles, care of Ernest E. Noon, Bank of America Building, Beverly Hills, Cal., representative, has been organized by Earl E. Cotanch and C. A. Reed, to manufacture special transmission equipment and devices.

Horluck Malt & Brew Co., Seattle, George F. Horluck, president, has plans for three-story addition at Westlake and Mercer Streets, where property was recently acquired. Part of unit will be equipped for tank house and allied service. Cost over \$75,000 with equipment. Entire expansion and modernization of existing plant will cost about \$200,000 with machinery. Richard Ullrich, Smith Tower Annex, is engineer.

Corning High School District, Corning, Cal., has asked bids on general contract for new school at Los Molinas, Cal., to include one-story manual training shop, 36 x 100 ft. W. E. Coffman, Forum Building, Sacramento, Cal., is architect.

Hemerich Brewing Co., 2918 Airport Way, Seattle, affiliated with Hemerich Investment Co., same address, has let general contract to Henrikson-Alstrom Construction Co., Textile Tower Building, for extensions and improvements in property recently leased at 5227 East Marginal Way, including three-story unit. Cost over \$100,000 with machinery. John Graham, Dexter-Horton Building, is architect.

AN MPORTANT ANNOUNCEMENT



AN exclusive arrangement has just been perfected whereby the American Chain Company will fabricate and sell wire, cable and other products fabricated from Allegheny Metal and Allegheny Alloys.

Wire in all its various forms will be produced in their Page Steel & Wire Company Plant at Monessen, Penna. . . . Cable will be produced in their Hazard Wire Rope Plant at Wilkes-Barre, Penna.

ALLEGHENY STEEL  CO., Brackenridge, Penna.

Sales Offices and Warehouse Stocks in the Principal Cities
Stocks carried by Jos. T. Ryerson & Son, Inc. Warehouses—Dunham, Carrigan & Hayden Co., San Francisco;
Union Hardware & Metal Co., Los Angeles

Final Figures Show 1932 Ingot Output of 13,464,402 Tons

Rise Revealed in Ratio of Electric Steel Made—Alloy Steel Proportion Also Higher; That of Duplex Steel Lower

PRODUCTION of steel ingots in 1932 totaled 13,464,402 gross tons, according to the annual bulletin on production issued by the American Iron and Steel Institute. Total output of steel castings was 216,760 tons, so that the total of both ingots and castings was 13,681,162 tons. Production of open-hearth and Bessemer ingots—13,322,833 tons—was 19.76 per cent of last year's mean capacity of 67,429,880 tons.

Output of ingots showed a decline of 47 per cent from 1931. The recession in electric steel ingots—40 per cent—was below the general average. The decline in steel castings output was 58 per cent. Of the various classes of steel castings, acid steel castings showed the greatest decline—67 per cent. Basic open-hearth castings were off 63 per cent, while electric steel castings dropped 43 per cent.

The proportion of electric steel ingots made during the year was 1.05

per cent of the total ingot output. In 1928, electric ingots represented 0.9 per cent; in 1929, 0.97 per cent; in 1930, 0.775 per cent, and in 1931, 0.92 per cent of all ingots made. The proportion of duplex steel ingots and castings underwent another decline. Whereas 12 to 15 years ago from 11 to 12 per cent of all the steel made was produced by the duplexing process, the percentage fell in 1931

to 4.28 per cent and in 1932 to 2.1 per cent.

Alloy steel ingots produced in 1932 represented 5.54 per cent of the total ingot output, as compared with 5.38 per cent in 1931. The ratio was 6 per cent in 1928, close to 7 per cent in 1929 and 5.89 per cent in 1930. Production of alloy steel castings in 1932 represented 18.9 per cent of all castings made as against 17.4 per cent in 1931. Ten or 12 years ago the ratio was only about 5 per cent.

Total production of rolled steel in 1932 was 10,352,376 tons, showing a general average yield from ingots of 76.8 per cent. The yield in 1931 was 74.5 per cent. Some comparative figures are given in the accompanying table, which includes rolled iron as well as steel.

Accurate Results in Spark Testing —Magnetic Tests Also Successful

Interesting data on spark testing and on magnetic analysis for determining the uniformity of bar steel were given at the recent meeting of the Hartford (Conn.) chapter of the American Society for Steel Treating.

The address on spark testing was by Frank A. Starkey, Pratt & Whitney Aircraft Co. It was about 14 years ago, he said, that spark testing of steel was first attempted at the plant of the Whitney Mfg. Co., in Hartford. A number of steels were analyzed for standards and then tests made of other steels by comparison. Carbon was thus determined accurately by sparking. From that time dependence on it has grown.

The art has been so perfected, said Mr. Starkey, that selection by spark testing of low-chromium steels from nickel steels (3.50 per cent) is constantly accomplished. A differentiation between cobalt high-speed steel and the standard tungsten steels is common practice. And to separate 3 per cent from 5 per cent Ni steels is a regular feat. Even a separation of mixed lots of S.A.E. 1020 and 1120 (low-carbon) steels is accomplished, one case of a large lot of bars having been sorted in 1½ days at a certain cold drawn mill.

An interesting statement of the speaker was the use of the spark test in detecting the carbon in the open-hearth bath as it came down. A mold about ¾ in. round and 5 in. long is used into which the sample is poured. This is used for the spark test. Ladle analyses of 225 heats checked the spark results with a variation of less than 0.02 per cent, claimed Mr. Starkey. Tests were made every 4 min.

Mr. Starkey, who installs his system in various plants by conducting classes, emphasized the fact that the efficiency of spark testing is establish-

ed but constant practice is essential.

A medium grain wheel of 46 O alundum running at a speed of about 3400 ft. per min. (3000 to 4000) is employed. It must travel at a high speed to achieve successful results. No hooded cabinet is used; it is hard on the eyes to work in the dark, yet the sunlight should be kept out. Color is not so important as the shape of the spark and how it breaks. He places the steel to be tested on the side of the wheel, not on the flat edge. Chromium gives the most trouble to determine closely. The nickel shows up all around the wheel. Color is a factor in distinguishing cobalt from regular high-speed steel. It is very important to keep the wheel clean, especially when low-carbon or soft steels are being tested.

Magnetic analysis as a test for uniformity of bar steels has been used by the Union Drawn Steel Co., Hartford, for some time, according to James Allison, metallurgist of the company. The apparatus employed, made by the Magnetic Analysis Corp., Long Island City, N. Y., was illustrated by lantern slides and the results obtained on various steels were shown by graphs. More than 1500 tons of cold drawn bars have been tested in the past seven months.

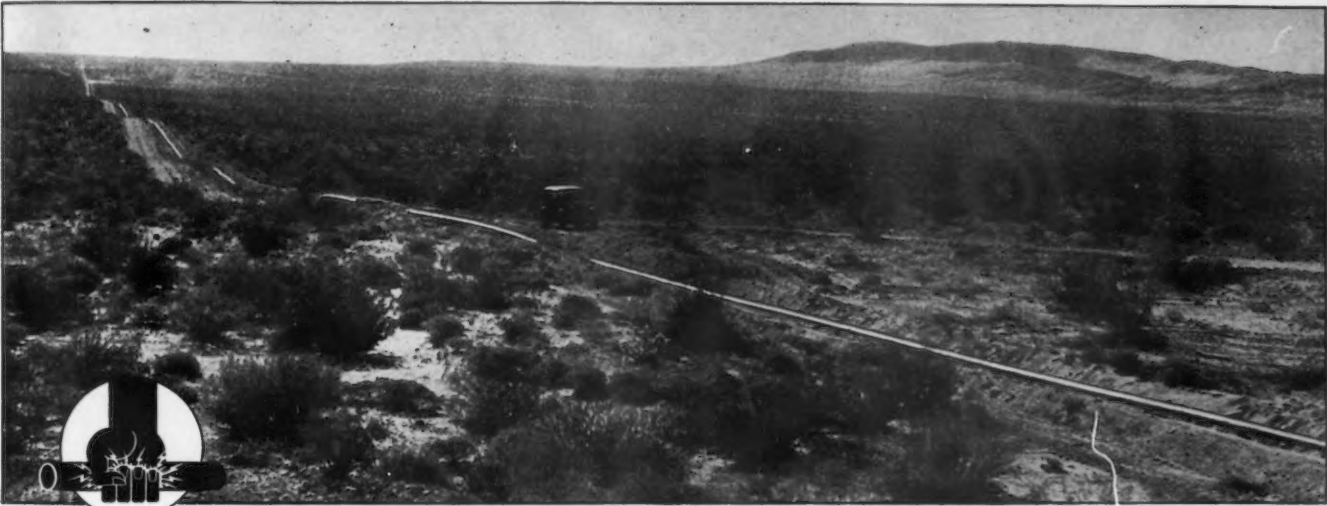
In all tests, a standard steel of the same material and size is used. Mr. Allison called particular attention to two facts. One that he had been able to sort with the apparatus was a mixture of several tons of steel bars of practically the same carbon content, one containing about 3 per cent Ni and the other 5 per cent Ni. The other was the assurance that, at not greatly additional cost, it is possible to guarantee the consumer by magnetic analysis a bar product free from seams.

PRODUCTION OF INGOTS AND CASTINGS			
Per Gross Ton			
Ingots	1931	1932	
Basic open-hearth...	21,986,933	11,689,495	
Acid open-hearth...	194,388	104,794	
Bessemer	3,011,394	1,528,544	
Crucible	831	241	
Electric	235,376	141,328	
Total ingots....	25,428,922	13,464,402	
Castings			
Basic open-hearth...	143,465	53,187	
Acid open-hearth...	184,780	59,854	
Bessemer	12,052	3,532	
Crucible	716	404	
Electric	175,566	99,783	
Total castings..	516,579	216,760	
PRODUCTION OF FINISHED ROLLED IRON AND STEEL			
Gross Tons			
	1931	1932	
Rails	1,157,751	402,566	
Universal plates...	614,837	309,653	
Sheared plates...	1,351,375	520,177	
Black sheets.....	2,538,014	1,471,532	
Black sheets on tin mills	1,535,355	1,141,946	
Wire rods.....	1,844,620	1,186,181	
Structural shapes...	2,062,858	937,228	
Merchant bars.....	2,444,395	1,313,896	
Bars for rein. conc.	643,633	385,605	
Skelp, pipe steel, etc.	1,499,280	607,599	
Hoops	56,003	42,697	
Cotton ties, etc....	57,112	37,725	
Splice bars, tie plates, etc.....	389,579	147,915	
Hot-rolled strips, etc.	1,620,971	1,185,184	
Rolled sheet piling..	73,670	52,625	
Railroad ties.....	14,246	4,516	
Forging blooms and billets	114,664	76,360	
Billets, sheet bars, etc., export.....	1,960	1,000	
Billets for seamless tubes	732,569	370,270	
All other rolled products	423,002	256,413	
Total*	19,175,894	10,451,088	

*Of the total, 188,726 tons was iron in 1931 and 98,712 tons in 1932.



ANOTHER TRIBUTE



REPUBLIC *ELECTRIC WELD* LINE PIPE

One of the largest pipe orders placed on the Pacific Coast in 1932 was given on December 28th by the Board of Directors of the Metropolitan Water District, representing 13 cities of Southern California, and calling for 180 miles of Republic Electric Weld Pipe in 5 and 8-inch sizes. Just another tribute to this better pipe.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES  YOUNGSTOWN, OHIO



Molybdenum Enhances Properties of Cast Steels

A CONTRIBUTION from the Battelle Memorial Institute, Columbus, Ohio, by Dr. H. W. Gillett, director, and J. L. Gregg, metallurgist, is entitled "Molybdenum in Cast Steel" and was presented at a session on steel castings at the annual convention of the American Foundrymen's Association in Chicago, June 20 to 23.

The behavior of molybdenum in the cast steels, the authors say, is naturally analogous to its action in similar wrought steels, always, of course, keeping in mind the inherent differences which must exist especially as to ductility and impact in any cast metal, mainly due to absence of work.

Increases High-Temperature Strength

Of prime importance in these steels is the marked increase in their high-temperature strengths. There is ample indication that simple-annealed or normalized-and-drawn carbon-molybdenum cast steels have virtues for high-temperature service not yet fully appreciated. The most outstanding properties conferred by molybdenum on steel are only noted ordinarily in the quenched and tempered condition. Molybdenum decreases the rate at which the steels must be cooled in order to become martensitic. Accordingly it tends—in proper amount and combination—to produce an air-hardening steel or, in lesser amount and with less of other alloys, one hardenable by a mild air-quench.

It requires a considerable content of molybdenum in a straight carbon-molybdenum steel to produce a high-strength product comparable, by the conventional physical tests, with some other fairly low-alloy steels. Since molybdenum costs 80 to 85c. (the salt 80c., ferroalloy 95c.) per pound, the plain molybdenum steels are not ordinarily used where static figures alone determine their suitability. It happens, however, that many of the inherent properties conferred by molybdenum on steel are shown as the result of the addition of quite small amounts of it, with great static improvement, if it be used in conjunction with other alloy additions.

A further feasibility of using molybdenum lies in the fact that the recovery of the metal is very high. Since molten iron will reduce molybdenum from its oxide, there is practically complete freedom from loss when remelting gates and risers. The use of molybdenum introduces no new foundry difficulties and has been said to minimize some of the old ones, such as cracking in the mold.

Molybdenum is compatible with other alloying elements and reduces

the amounts of those elements required. Hence, we have the manganese-molybdenum, the chromium-molybdenum, the nickel-molybdenum, and the vanadium-molybdenum steels, or molybdenum steels containing two, three, or even four of other alloying elements, enabling the attainment of combinations of very high mechanical properties which may be sought in quenched and tempered steels.

Heat-treated alloyed-steel castings frequently are used in place of forg-

ings for purposes which few today would have thought some years ago could ever be satisfied by castings. Large castings, which then could have been made only in the annealed or normalized condition, are now being quenched successfully in air or oil, and subsequently tempered.

The readiness with which molybdenum fits in with other alloying elements to give steels high in physical properties when quenched and tempered, the added ease and certainty in hardening throughout in quenching produced by molybdenum, and the ability to remove casting strains by a high-temperature draw without softening castings too much, make the element a good friend alike to steel foundrymen and to the user of steel castings, according to the authors.

Malleableizing Shortened by Superheating

AN attempt to shorten the annealing cycle of malleable iron castings as well as to gain a better understanding of the mechanism of graphitization was the object of a recent investigation by A. E. White and R. Schneidewind of the department of engineering research of the University of Michigan. Their findings were outlined in a paper, "Effect of Superheat on Annealing Malleable Iron," presented before a session on malleable iron at the annual convention of the American Foundrymen's Association in Chicago, June 20 to 23.

Three groups of irons were investigated, the first consisting of specimens of standard foundry composition, the second and third being made in a rocking arc electric furnace of a low-carbon and low-silicon type. The temperature of melting affects the structure of gray cast iron and the annealing rates of white cast iron. By increasing the amount of superheat, but with a constant pouring temperature, the graphite particles decrease in size with accompanying increase in physical properties until a point is reached at which it is difficult to obtain purely pearlitic irons, since the graphite particles have a tendency to be surrounded by ferrite envelopes.

The first iron, a standard foundry composition, was melted in a cupola at about 2700 deg. F., and then refined and superheated in a Pittsburgh electric furnace at 2900 deg. F. Annealing tests were conducted in a muffle-type furnace with suitable atmospheric control. The time necessary to complete first-stage graphitization, that is, to decompose completely all the massive cementite, was determined by heating specimens for

various lengths of time at 1700 deg. F. and examining metallographically. Second-stage graphitization was studied at 1325 deg. F. Specimens were heated to equilibrium at 1700 deg. F., cooled in four hr. to 1400 deg. F., then cooled to 1325 deg. F. in one hr. and held at this temperature for various lengths of time. Completeness of malleableization was determined by the microscope. Increasing the temperature from 2750 to 2900 deg. F. brings about a shortening of the annealing cycle of from 10 to 12 per cent. Increasing the temperature to 2970 deg. F. results in a saving of time of 28 per cent.

One of the electric furnace irons was superheated at 3150 deg. and the other at 2865 deg. F., with the pouring temperature from the ladle at 2750 deg. F. The total annealing cycle was shortened about 40 per cent by increasing the temperature of the melt from 2865 to 3150 deg. F. In all cases the authors showed photomicrographs illustrating the effects on structures of the various steps.

Cycle Can Be Reduced 25 Hr.

It is the opinion of the authors that the use of a well-designed tunnel kiln can reduce the cycle at least 25 hr. Elimination of packing material in such a furnace will permit bringing to heat in 15 to 20 hr. The temperature can also be dropped from the soaking temperature to the critical in less time in a tunnel kiln. This is advisable because, when the work has been graphitized to equilibrium in the first stage, an excessively slow rate of cooling to the critical serves no useful purpose. Progressive plants having facilities for superheating can effect further reductions of from 15 to 20 hr. in the actual annealing time in irons of normal composition.



Are You Ready for the Lightning to Strike?

The sweep of national events foretells the revival of business, just as this flash of lightning was forecast by the rush of the storm.

When business comes, is your plant ready for the prompt deliveries that will be demanded?

Isn't right now the time you have been waiting for, just before the pick-up comes, to overhaul your forge-shop equipment, replace those parts that have been robbed

for some other machine, junk some obsolete equipment?

Get your lightning rod ready, for the lightning's going to strike soon.

ERIE FOUNDRY COMPANY

ERIE, PENNA., U. S. A.

DETROIT: 335 CURTIS BUILDING
CHICAGO: 549 WASHINGTON BLVD.
INDIANAPOLIS: 335 POSTAL STATION BUILDING
PARIS, FRANCE 8 RUE DE ROCROY

STEAM DROP HAMMERS—BOARD DROP HAMMERS
FORGING AND TRIMMING PRESSES
SINGLE- AND DOUBLE-FRAME HAMMERS



Die Casting Iron and Steel

(Concluded from Page 1030)

ing are easier. Because of the accuracy possible in die casting, machine work in many cases can be eliminated.

Under favorable conditions molds used in die casting of iron will show a comparatively long life and relatively low cost. The castings should be quickly poured and quickly removed so that the hot metal is in contact with the mold as short a time as possible. In die casting camshafts the molds are cooled with circulating air; in other cases water or oil has been successfully used. The molds are made up with radiating fins on the back. These are easily cast by using a dry sand core in which small holes have been drilled. The design of the molds for the camshafts is shown in one of the accompanying illustrations, which indicates the actual position of the mold in the machine.

The best material for molds has not been definitely determined, although a high grade alloy is being used for the camshaft molds. The cost of material is almost a negligible item if the life of the mold is appreciably increased. For instance, a mold weighing 2000 lb. made of ordinary cast iron at 5c. per lb. will show a material charge of \$100 and may show a labor charge of \$500. Against this total of \$600 an expensive material may cost \$1,000 with the same labor charge of \$500, but if the mold in the second case lasts three times as long as in the first case, it will be economical to use it, and the chances are that it will last much more than three times as long.

Experience so far indicates that the mold should be designed for bottom pouring and that the parting plane should be vertical. Such parting is better for venting and also is safer for the operator. When metal is forced under pressure into a horizontally parted die, some accident may cause it to squirt out anywhere within 360 deg., but with vertical parting the operator can simply keep out of line of the parting and be safe

against accident. In any case use of a shield is good practice.

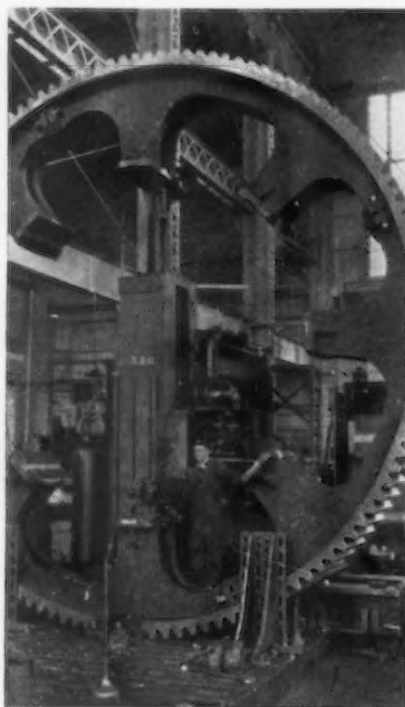
The cost of a die for die casting of iron will average about half that of a similar die required for forging.

Design and Manufacture of Large Gears

(Concluded from page 1023)

in determining 90 deg. on the segment by distance *B* to *D*.

After end of segment has been milled a trial cut is taken in the key-



Cutting keyways to match those of the spider. This work is done on a horizontal slotter.

way and point *D* rod is wedged into slot, and measurements taken at *C-D*, *D-A*, and *D-B*. Measurement *A-B* is

also checked, assuring the shop of a uniform piece of work. All sizes are taken with standard pin gages, and by the use of a thickness gage, small errors can be detected readily. The pin gages were accurately set for all working dimensions on a Pratt & Whitney measuring machine.

Beryllium-Copper Castings

(Concluded from Page 1027)

One was recently made by the Columbian Bronze Co., Freeport, N. Y., weighing about 18 lb. It was possible to decrease the thickness 25 per cent from the metal propeller which it displaced. Its use decidedly augmented the speed of the boat. The paper describes a special heat treatment discovered for this casting.

Other applications described in brief detail are beryllium-copper cams for certain large can-making machines; gears and pinions, particularly worm gears, for buses; chilled rifle bar nuts for rock drills; propeller hub cones for airplanes; and valve parts and centrifugal pump parts for line valves. Because of its corrosive-resistance properties, this alloy has been found to give unusually satisfactory performance in the oil industry where handling of extremely corrosive and abrasive sulphur compounds is necessary.

Attention is called to a 12.5 per cent beryllium-nickel alloy from which results similar to the copper alloy are expected.

Simplified Practice Activities

Recommendations covering milling cutters and cupola refractories respectively have been mailed by the division of simplified practice of the Bureau of Standards to all interests in those industries for consideration and written approval.

The milling cutters recommendation (R36) is a revision drafted by the industry's standing committee, and effects a reduction in the number of stock sizes and varieties shown in the previous schedule. The recommendation covering cupola refractories, proposed and formulated, provides a simplified list of sizes for cupola blocks, one and two hole tap-out blocks, and slag hole blocks.

Existing schedules covering sheet steel, and iron and steel roofing, respectively, have been reaffirmed without change by the standing committee of the industry. The sheet steel recommendation embraces the various gages of galvanized flat, one-pass cold rolled box annealed and blue annealed sheets. Style and form, width, length, gage and weight of roofing are contained in the iron and steel roofing simplified schedule.

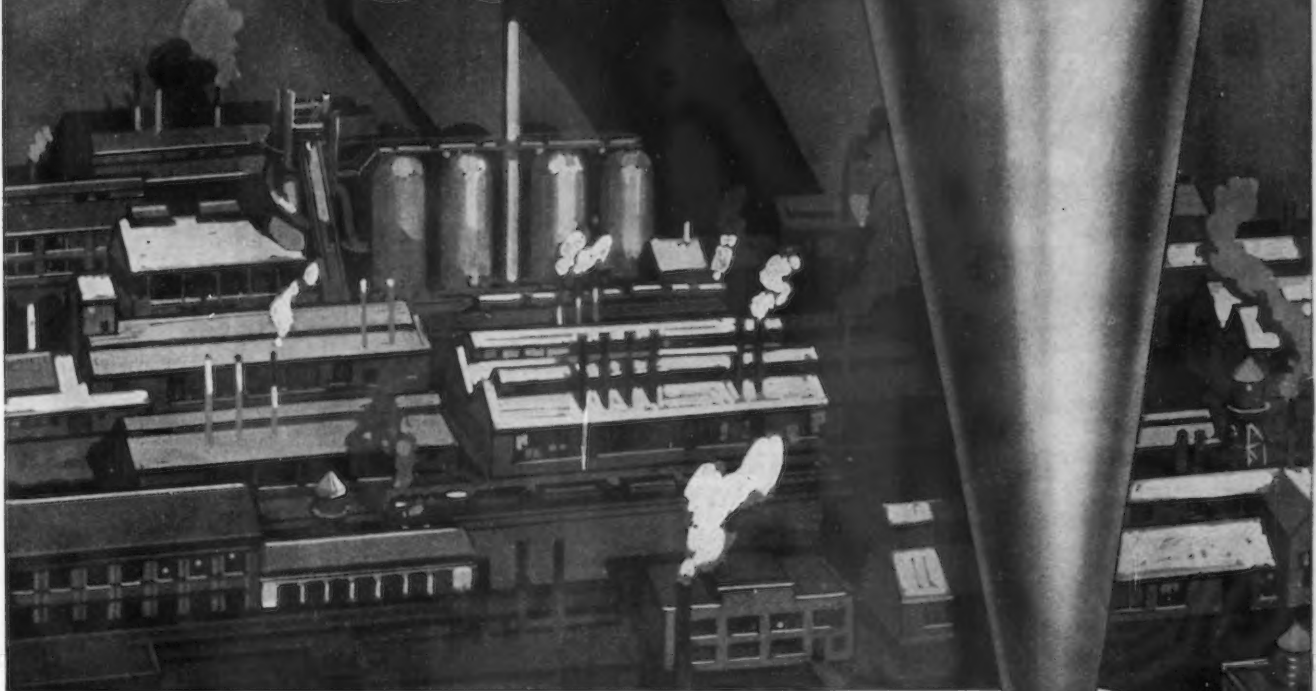
TABLE I—CAST IRONS WHICH WILL DIE CAST

Carbon	Man- ganese	Silicon	Chro- mium	Nickel	Molyb- denum	Sul- phur	Phos- phorus	Miscellaneous (1) Vanadium (2) Aluminum
3.75	1.00	2.50	...	...	...	0.10	0.30	...
3.50	0.80	2.75	...	0.25	...	0.10	0.30	...
2.50	0.50	2.20	...	...	0.30	0.05	0.10	(1) 0.15
2.00	0.60	1.00	0.40	0.85	0.20	0.05	0.05	...
3.50	0.15	0.50	0.50	...	...	0.05	0.05	...
2.75	0.50	2.00	0.20	0.75	0.75	0.10	0.10	...
2.00	0.30	1.75	...	...	...	0.08	0.08	...
2.50	0.70	2.10	0.25	0.25	...	0.10	0.10	...
2.75*	0.15	2.00	...	1.00	0.50	0.05	0.05	(2) 0.30
3.25*	0.70	2.20	...	0.80	0.50	0.05**	0.05**	(2) 1.00

*Will nitride.

**Maximum.

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BOILER
TUBES

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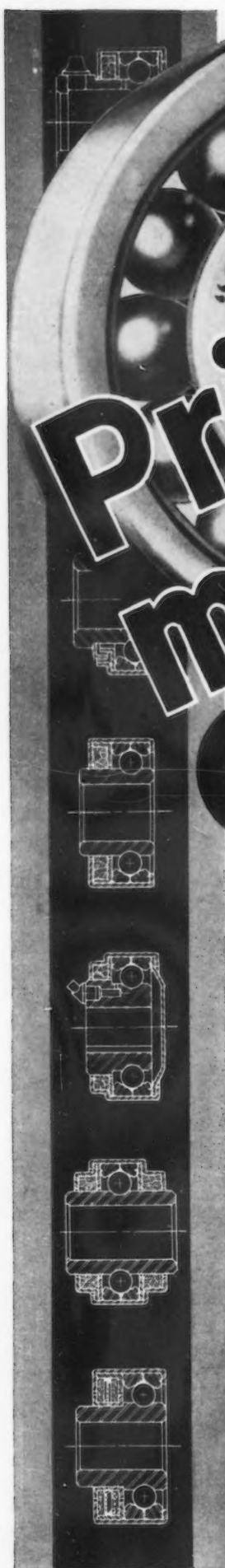
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The conveyor screw is Chrome-Vanadium Steel... *and not one has failed in service*

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Is the dependability of a steel part a vital factor in the service of *your* product? Our Metallurgists will be glad to study your problem and offer their suggestions. No obligation, of course.

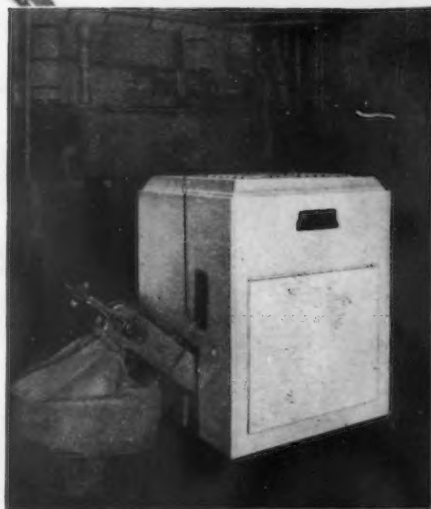
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Bridgeville, Pa.

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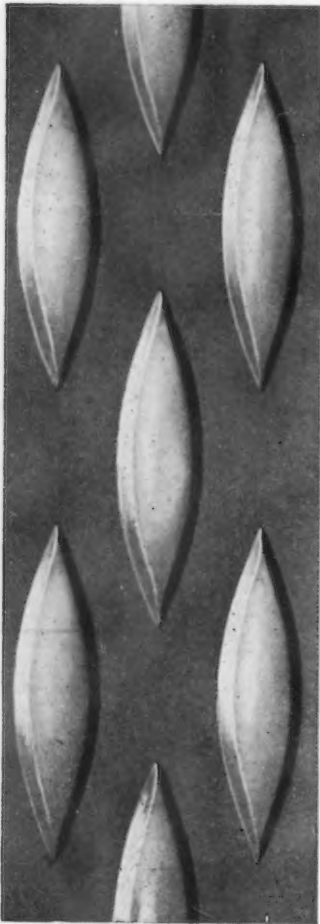
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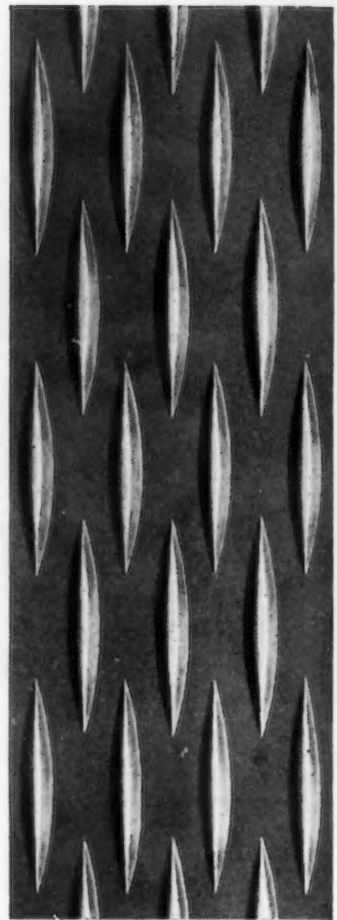
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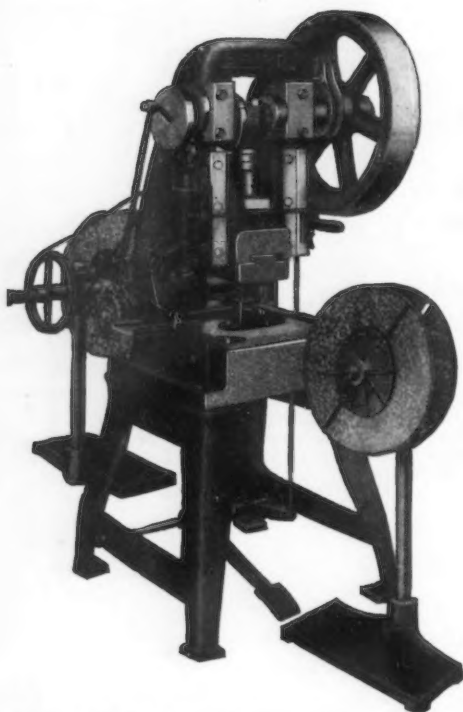
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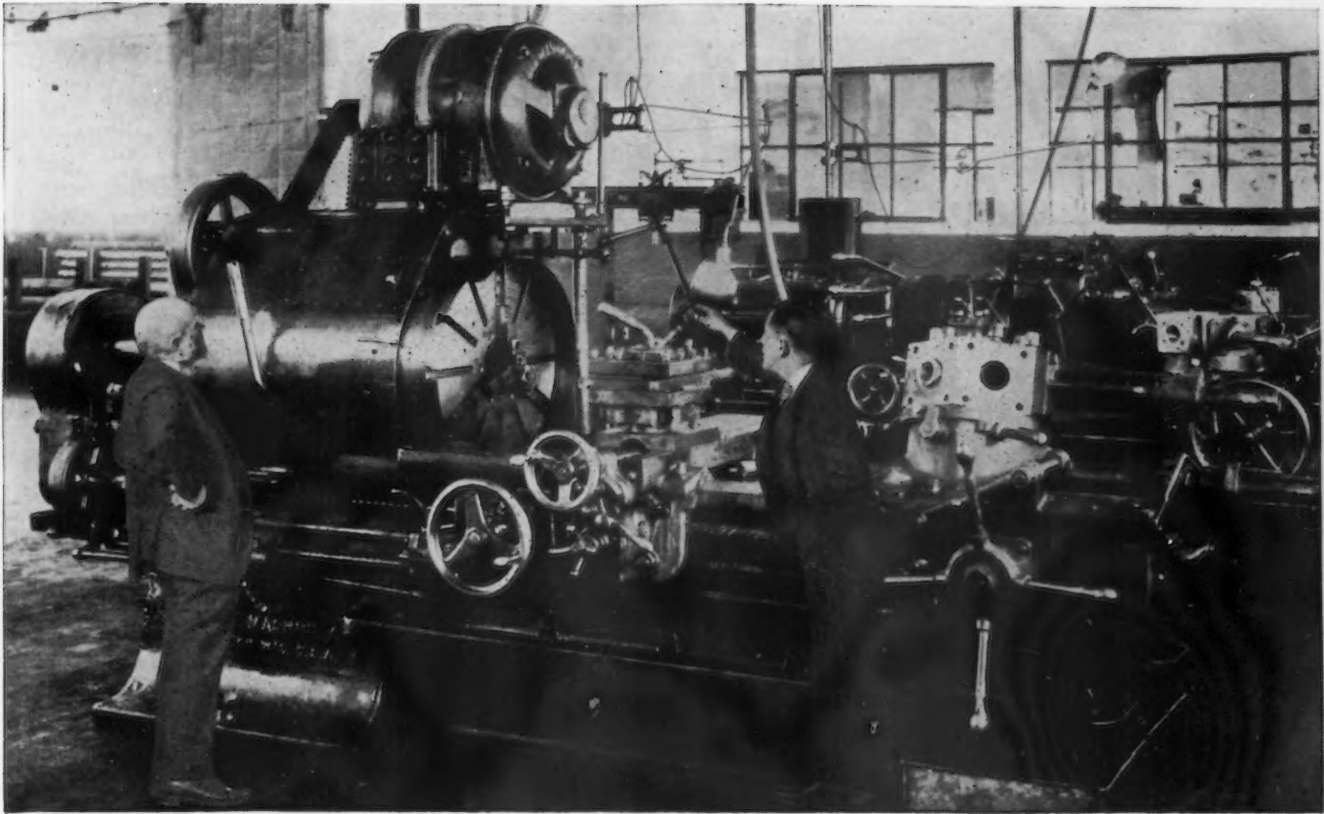
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Between
Us*



We Succor a Drawbridge in Distress

SOME months ago we were trying to convince the members of a certain engineering firm that life, with THE IRON AGE coming to them every week, would be one sweet dream. "It will help you solve your hardest problems," we told them.

"Well, here's a chance to make good," they said. "What have you on the subject of the lubrication of drawbridge bearings?" We were aghast. Up to that time we were not conscious of the fact that drawbridges had bearings; and even if they had bearings, that they required lubrication never occurred to us.

In fact, if someone had suddenly snapped at us, "What subject have you given least thought to all during your life?," we would have unhesitatingly answered, "Drawbridge bearing lubrication!"

Nevertheless, we did a swan dive into our files. And lo and behold what should we run into but a recent article on lubrication, with particular reference to drawbridges. Triumphant we flicked it under the twitching nostrils of the consulting engineers.

A few days ago we saw them again. "We tried that lubricant formula," they said, "and haven't had any trouble since. Blessings on THE IRON AGE."

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Jauvert Had Nothing on Us

IN our youth we were mightily impressed with the character Jauvert in Victor Hugo's "Les Misérables." We are not sure of the spelling. We are not even certain that it was "Les Misérables." Maybe it was "The Count of Monte Cristo" or "Black Beauty." Anyway, Jauvert was a detective who always got his man. The North-western mounted police are simply carbon copies of him.

Jauvert is our ideal in sleuthing inquiries from subscribers. A few days ago one of the chief technicians on the big bridge that will span the Golden Gate wrote in for an article on bridge wire published in THE IRON AGE some years ago. We found it and he has it.

A manufacturer writes for a galvanizing article published in 1917; an engineer wants a table of tests published in 1924. Just the other day someone wrote for an article published in the dear, dead days of 1907, twenty-six years ago, when we all foolishly believed that the laws of supply and demand, like the law of gravitation, could neither be repealed nor suspended.

We could not furnish a clipping of that article, but we did supply photostats, made from our bound volumes on file here. Photostats cost only thirty-five to forty cents a page. So if you ever want a copy of anything that appeared in THE IRON AGE, we'll get it for you somehow.

—A. H. D.

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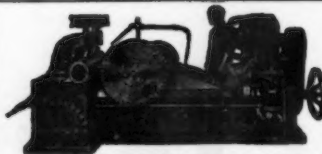
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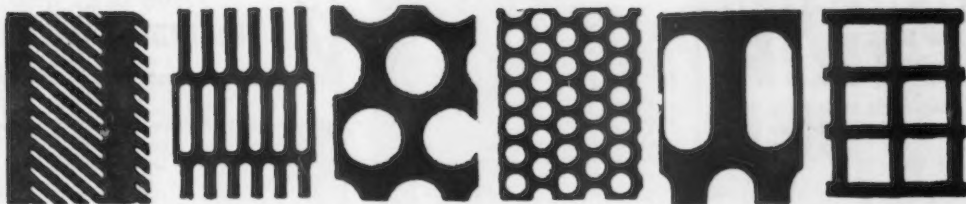
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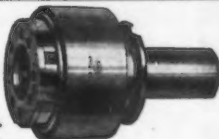
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4"	19.00	17.50	16.50	16.00	15.50	15.00
5"	23.75	21.88	20.63	20.00	19.38	18.75
6"	28.50	26.25	24.75	24.00	23.25	22.50
8"	35.00	33.00	32.00	32.00	30.00	29.00
1/2 page	46.67	44.00	42.67	42.67	40.00	38.67
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Ames, W., & Co., Jersey City, N. J.

Andrews Steel Co., The, Newport, Ky.

Bethlehem (Pa.) Steel Company.

Carnegie Steel Co., Pittsburgh.

Illinois Steel Co., Chicago.

Jones & Laughlin Steel Corp., Pittsburgh.

Republic Steel Corp., Youngstown, Ohio.

Ryerson, Joseph T., & Son, Inc., Chicago.

Steel & Tubes, Inc., Cleveland.

Timken Roller Bearing Co., Canton, Ohio.

Timken Steel & Tube Co., The, Canton, O.

Weirton (W. Va.) Steel Co.

Youngstown (Ohio) Sheet & Tube Co.

BATTERIES—Storage

Electric Storage Battery Co., Phila.

BEAMS—See Angles, Beams, Channels and Tees

BEARINGS—Babbitt

Bunting Brass & Bronze Co., Toledo, O.

BEARINGS—Ball

Bantam Ball Bearing Co., South Bend, Ind.

Federal Bearings Co., Inc., Poughkeepsie, N. Y.

New Departure Mfg. Co., Bristol, Conn.

S. K. F. Industries, Inc., 40 East 34th St., N. Y. C.

Schatz Mfg. Co., The, Poughkeepsie, N. Y.

BEARINGS—Brass and Bronze

Bunting Brass & Bronze Co., Toledo, O.

BEARINGS—Laminated, Non-Metallic

Synthane Corp., Oaks, Pa.

BEARINGS—Oilless

Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.

BEARINGS—Radial

Bantam Ball Bearing Co., South Bend, Ind.

S. K. F. Industries, Inc., 40 East 34th St., N. Y. C.

BEARINGS—Roller

Federal Bearings Co., Inc., Poughkeepsie, N. Y.

S. K. F. Industries, Inc., 40 E. 34th St., N. Y. C.

Schatz Mfg. Co., The, Poughkeepsie, N. Y.

Timken Roller Bearing Co., Canton, O.

Timken Steel & Tube Co., The, Canton, O.

BEARINGS—Roller Tapered

Timken Roller Bearing Co., Canton, O.

Timken Steel & Tube Co., The, Canton, O.

BEARINGS—Shaft Hanger

S. K. F. Industries, Inc., 40 East 34th St., N. Y. C.

BEARINGS—Thrust

S. K. F. Industries, Inc., 40 East 34th St., N. Y. C.

Timken Roller Bearing Co., Canton, O.

Timken Steel & Tube Co., The, Canton, O.

BELT FASTENERS

Clipper Belt Lacer Co., Grand Rapids, Mich.

BELT LACER

Clipper Belt Lacer Co., Grand Rapids, Mich.

BELTING—Metal, Conveyor, High and Low Temperature

Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

BELTING—Rubber

Goodrich, B. F., Rubber Co., Akron, Ohio.

BELTS—V-Type

Allis-Chalmers Mfg. Co., Milwaukee.

BENDING MACHINES—Hand, Band and Angle

Excelsior Tool & Mch. Co., E. St., Louis, Ill.

BENDING MACHINES—Hand and Power

Dreis & Krump Mfg. Co., Chicago.

BENZOL RECOVERY PLANTS

Koppers Construction Co., The, Pittsburgh.

BILLETS—Alloy Steel

Andrews Steel Co., The, Newport, Ky.

BILLETS—Carbon Steel

Andrews Steel Co., The, Newport, Ky.

BILLETS—Carbon Vanadium Steel

Andrews Steel Co., The, Newport, Ky.

BILLETS—Chrome Nickel Steel

Andrews Steel Co., The, Newport, Ky.

BILLETS—Chrome Steel

Andrews Steel Co., The, Newport, Ky.

BILLETS—Die Steek Steel

Andrews Steel Co., The, Newport, Ky.

BILLETS—Forging

Alan Wood Steel Co., Conshohocken, Pa.

Andrews Steel Co., The, Newport, Ky.

Central Iron & Steel Co., Harrisburg, Pa.

Harrisburg (Pa.) Pipe & Pipe Bending Co.

Midvale Co., The, Nicetown, Phila., Pa.

Republic Steel Corp., Youngstown, Ohio.

BILLETS—Nickel Steel

Andrews Steel Co., The, Newport, Ky.

BILLETS—Re-rolling

Alan Wood Steel Co., Conshohocken, Pa.

Andrews Steel Co., The, Newport, Ky.

BILLETS—Steel

Bethlehem (Pa.) Steel Company.

Central Iron & Steel Co., Harrisburg, Pa.

Inland Steel Co., Chicago.

Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

BIMETAL—Thermostatic

Chace, W. M. Valve Co., Detroit, Mich.

BLANKS—Chisel

Cleveland Steel Tool Co., The, 680 E. 82d St., Cleveland, Ohio.

BLAST FURNACE SPECIALTIES

Demag Corp., Duisburg, Germany.

BLOWERS

American Gas Furnace Co., Elizabeth, N. J.

BLOWERS—Centrifugal

General Electric Co., Schenectady, N. Y.

BLUE PRINTING MACHINES

Paragon-Revolute Corp., 69 South Ave., Rochester, N. Y.

BOLT CUTTERS

Acme Mchry. Co., Cleveland, O.

Landis Mch. Co., Inc., Waynesboro, Pa.

National Mchry. Co., Tiffin, Ohio.

BOLT AND NUT MACHINERY

Acme Machinery Co., Cleveland.

Landis Machine Co., Inc., Waynesboro, Pa.

National Mchry. Co., Tiffin, Ohio.

BOLT & RIVET CLIPPERS

Helwig Mfg. Co., St. Paul, Minn.

BOLTS—Carriage and Machine

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Special

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Trask

Illinois Steel Co., Chicago.

Inland Steel Co., Chicago.

BOLTS AND NUTS

Ames, W., & Co., Jersey City, N. J.

Clark Bros. Bolt Co., Milldale, Conn.

Oliver Iron & Steel Corp., Pittsburgh.

Republic Steel Corp., Youngstown, O.

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N. Y.

Ryerson, Jos. T., & Son, Inc., Chicago.

BORED—Grinding Wheel

Bakelite Corp., 247 Park Ave., N. Y. C.

BORING, DRILLING AND MILLING MACHINES—Horizontal

Schless-Defries A.-G. Düsseldorf, Germany.

BORING & TURNING MILLS—Vertical

Schless-Defries A.-G. Düsseldorf, Germany.

BOXES—Paper, Metal Edge

National Metal Edge Box Co., 1208 Calhoun St., Philadelphia.

BRACKS—Electric & Mechanical

Electric Controller & Mfg. Co., Cleveland.

BRACKS—Metal Forming

Dreis & Krump Mfg. Co., Chicago.

Schatz Mfg. Co., The, Poughkeepsie, N. Y.

BRICK—Fire Clay

Carborundum Co., The, Niagara Falls, N. Y.

BRIDGE BUILDERS

American Bridge Co., Pittsburgh.

Belmont Iron Works, Philadelphia.

McClintic-Marshall Corp., Bethlehem, Pa.

BRIDGE OPERATING MACHINERY—Movable

Earle Gear & Mch. Co., Philadelphia.

BRONZE—Phosphor

Phosphor Bronze Smelting Co., Philadelphia.

Seymour (Conn.) Mfg. Co.

BUCKETS—Clamshell

Blaw-Knox Co., Pittsburgh.

Hayward Co., 50 Church St., N. Y. C.

BUCKETS—Electric Motor

Hayward Co., The, 50 Church St., N. Y. C.

BUCKETS—Orange Peel

Hayward Co., The, 50 Church St., N. Y. C.

BUILDINGS—Steel

American Bridge Co., Pittsburgh.

Belmont Iron Works, Philadelphia.

McClintic-Marshall Corp., Bethlehem, Pa.

Trucon Steel Co., Youngstown, Ohio.

BUSHINGS—Brass and Bronze

Bunting Brass & Bronze Co., Toledo, O.

Shenango-Penn Mold Co., Pittsburgh.

BUSHINGS—Oilless

Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.

BUSHINGS—Phosphor Bronze

Phosphor Bronze Smelting Co., Philadelphia.

BY-PRODUCTS COKE & GAS OVENS

Koppers Construction Co., The, Pith.

CABLE—Electric

General Electric Co., Schenectady, N. Y.

CABLEWAYS AND TRAMWAYS—See Tramways**CADMIUM**

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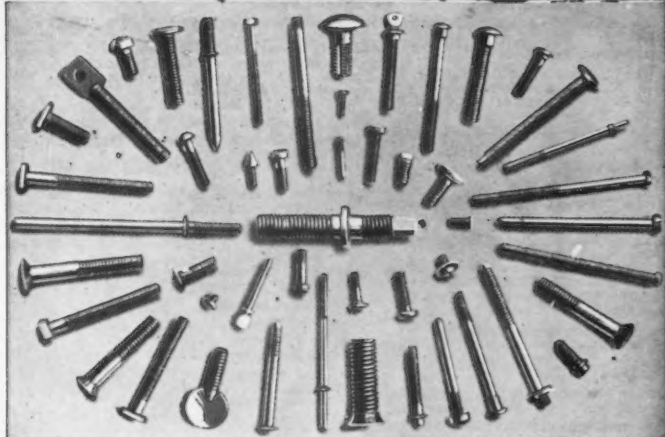
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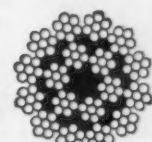
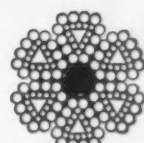
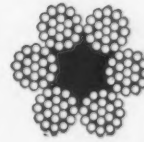
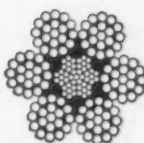
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FORGED TOOLS

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Phosphor Bronze Smelting Co., Philadelphia.

CLEANERS—MetalAmerican Chemical Paint Co., Ambler, Pa.
Ford, J. B. Co., Wyandotte, Mich.
Nukem Prods. Corp., 68 Niagara St., Buffalo, N. Y.**CLEANING MATERIALS—Glass**

Nukem Prods. Corp., 68 Niagara St., Buffalo, N. Y.

CLUTCHES—Magnetic

Dings Magnetic Separator Co., Milwaukee.

COALBarrows & Co., Inc., Philadelphia.
Cleveland (Ohio) Cliffs Iron Co.
Hanna Furnace Corp., The, Detroit, Mich.
Pickands, Mather & Co., Cleveland.**COAL ORE AND ASH HANDLING MACHINERY**Demag Corp., Duisburg, Germany.
Industrial Brownhoist Corp., Bay City, Mich.**COILS—Pipe**Harrisburg (Pa.) Pipe & Pipe Bending Co.
Pittsburgh (Pa.) Piping & Equipment Co.**COKE—Metallurgical**Barrows & Co., Inc., Philadelphia.
Pickands, Mather & Co., Cleveland.**COKE OVEN MACHINERY**Atlas Car & Mfg. Co., Cleveland.
Koppers Construction Co., The, Pgh.**COKE OVENS—By-Products**

Koppers Construction Co., The, Pgh.

COKE OVENS—Cross Regenerators

Koppers Construction Co., The, Pgh.

COKE OVENS—With Recovery of By-Products

Koppers Construction Co., The, Pgh.

COMBUSTION CONTROLS

Morgan Construction Co., Worcester, Mass.

COMPOUNDS—Drawing

Secony - Vacuum Corp., 26 Broadway, N. Y. C.

TIDE WATER OIL SALES CORP., 17 BATTERY PLACE, N. Y. C.**COMPRESSORS—Air**Demag Corp., Duisburg, Germany.
General Electric Co., Schenectady, N. Y.
Westinghouse Traction Brake Co., Industrial Div., Pittsburgh.**COMPRESSORS—Gas**

Demag Corp., Duisburg, Germany.

CONCRETE REINFORCEMENT

American Steel & Wire Co., Chicago.

CONTRACTORS' SUPPLIES—Second-HandAlbert & Davidson Pipe Corp., 2nd Ave., 50-51st St., Bklyn., N. Y.
Albert Pipe Supply Co., Inc., Berry & N. 13th St., Bklyn., N. Y.**CONTROLLERS—Electric**Electric Controller & Mfg. Co., Cleve.
General Electric Co., Schenectady, N. Y.**CONVEYOR WORMS**

Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.

COPING MACHINES

Schatz Mfg. Co., The, Poughkeepsie, N. Y.

CORE OIL

Secony - Vacuum Corp., 26 Broadway, N. Y. C.

SUN OIL CO., PHILADELPHIA.

Tide Water Oil Sales Corp., 17 Battery Place, N. Y. C.

CORUNDUM WHEELS—See Grinding Wheels**COTTERS AND KEYS—Spring**Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spg. Co., Pontiac, Mich.
Western Wire Prods. Co., St. Louis, Mo.**COUNTERBORES**Cleveland (Ohio) Twist Drill Co.
Morse Twist Drill & Mch. Co., New Bedford, Mass.**COUNTERS—Production**

Veeder-Root, Inc., Hartford, Ct.

COUNTING MACHINES

Veeder-Root, Inc., Hartford, Conn.

COUPLINGS—Flexible

Boston Gear Wks., Inc., Norfolk Downs, Mass.

COUPLINGS—Pipe

Harrisburg (Pa.) Pipe & Pipe Bending Co.

CRANES—Crawling TractorDemag Corp., Duisburg, Germany.
Industrial Brownhoist Corp., Bay City, Mich.**CRANES—Electric Traveling**Arnel, James P., Pgh.
Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.Morgan Engineering Co., Alliance, O.
Payne, N. B., & Co., 105 West 55th St., N. Y. C.

Shaw-Box Crane & Hoist Co., Inc., 402 Broadway, Muskegon, Mich.

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

Whiting Corp., Harvey, Ill.

CRANES—GantryCleveland Crane & Engineering Co., Wickliffe, Ohio.
Demag Corp., Duisburg, Germany.
Morgan Engineering Co., Alliance, Ohio.

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

Whiting Corp., Harvey, Ill.

CRANES—Hand Power

Cleveland Crane & Engineering Co., Wickliffe, Ohio.

Payne, N. B., & Co., 105 West 55th St., N. Y. C.

Shaw-Box Crane & Hoist Co., Inc., 402 Broadway, Muskegon, Mich.

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANES—Jib

Shaw-Box Crane & Hoist Co., Inc., 402 Broadway, Muskegon, Mich.

CRANES—Locomotive

Industrial Brownhoist Corp., Bay City, Mich.

CRANES—MonorailCleveland Electric Tramrail, Wickliffe, O.
Shaw-Box Crane & Hoist Co., Inc., 402 Broadway, Muskegon, Mich.

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANK SHAFTS

Union Drawn Steel Co., Massillon, Ohio.

CUTTER BLADES—Milling, Boring and Reaming

Haynes Stellite Co., 30 East 42nd St., N. Y. C.

CUTTERS—Keyseating

Davis Keyseater Co., Rochester, N. Y.

CUTTERS—MillingCleveland (Ohio) Twist Drill Co.
Morse Twist Drill & Mch. Co., New Bedford, Mass.**CUTTING-OFF MACHINES—Cold Saw**

Espan-Lucas Mch. Wks., Philadelphia.

CUTTING-OFF MACHINES—Pipe or Tubing

Bardons & Oliver, Cleveland.

Landis Mch. Co., Inc., Waynesboro, Pa.

CUTTING AND WELDING APPARATUS—Oxy-Acetylene—See Welding and Cutting Machines and Equipment—Oxy-Acetylene.**CYLINDERS—Compressed Air, Gas, Etc.**

National Tube Co., Pittsburgh.

CYLINDERS—Seamless

Harrisburg (Pa.) Pipe & Pipe Bending Co.

National Tube Co., Pittsburgh.

DEOXIDIZERS

Vanadium Corp. of America, 120 Broadway, N. Y. C.

DIES—Pipe Threading

Landis Mch. Co., Inc., Waynesboro, Pa.

DIES—Screw and Thread Cutting

Eastern Mach. Screw Corp., New Haven, Ct.

Jones & Lamson Mch. Co., Springfield, Vt.

Landis Machine Co., Inc., Waynesboro, Pa.

National Acme Co., The, Cleveland.

DIES—Self-Opening Adjustable

Eastern Mach. Screw Corp., New Haven, Ct.

Jones & Lamson Mch. Co., Springfield, Vt.

Landis Machine Co., Inc., Waynesboro, Pa.

National Acme Co., The, Cleveland.

DIES—Sheet Metal Working

Worcester (Mass.) Stamped Metal Co.

DIES—Steel Letters and Stamps

Noble & Westbrook Mfg. Co., Hartford, Ct.

DOLOMITE—Flux and Refractories

Basic Dolomite, Inc., Cleveland, Ohio.

DOORS—Steel (Copper Bearing)

Trucon Steel Co., Youngstown, Ohio.

DRAWN WORK—Metal—See Stampings or Drawings—Metal**DRILLING MACHINES—Bench**

Leland-Gifford Co., Worcester, Mass.

DRILLING MACHINES—Portable Pneumatic

Helwig Mfg. Co., St. Paul, Minn.

Warner & Swasey Co., The, Cleveland.

DRILLING MACHINES—Sensitive

Leland-Gifford Co., Worcester, Mass.

DRIVES—Gear

Mesta Machine Co., Pittsburgh.

DRIVES—Single and Multi V-Belts

Allis-Chalmers Mfg. Co., Milwaukee.

General Electric Vapor Lamp Co., Hoboken, N. J.

ELECTRIC WELDING—See Welding—Electric**ELECTRICAL EQUIPMENT**

Allis-Chalmers Mfg. Co., Milwaukee.

General Electric Co., Schenectady, N. Y.

ELECTRICAL WIRES

American Steel & Wire Co., Chicago.

Roebbing's, John A., Sons Co., Trenton, N. J.

ELECTROPLATING EQUIPMENT & SUPPLIES

Udylite Process Co., Detroit.

ELEVATORS—Steam Hydraulic

Ridgway, Craig & Son Co., Coatesville, Pa.

EMERY WHEELS—See Grinding Wheels

ENGINEERS—Consulting and Industrial

Koppers Construction Co., The, Pgh.

Perin Engineering Co., Inc., 11 West 42nd St., N. Y. C.

ENGINEERS—Foundry Consulting

National Engineering Co., Chicago

ENGINEERS—Management

Scovell, Wellington & Co., 10 East 40th St., N. Y. C.

ENGINEERS AND CONTRACTORS

Koppers Construction Co., The, Pittsburgh.

ENGINES—Diesel

Demag Corp., Duisburg, Germany.

ENGINES—Gas

Demag Corp., Duisburg, Germany.

FACING CLAY

Carborundum Co., The, Perth Amboy, N. J.

FEED WATER HEATERS AND PURIFIERS

Harrisburg (Pa.) Pipe & Pipe Bending Co.

FENCING—Wire

Pittsburgh (Pa.) Steel Co.

FERRO ALLOYS—Chromium

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Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y.

Samuel, Frank, & Co., Philadelphia.

Vanadium Corp. of America, 120 Broadway, N. Y. C.

FERRO ALLOYS—Manganese

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Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y.

Samuel, Frank, & Co., Phila.

Vanadium Corp. of America, 120 Broadway, N. Y. C.

FERRO ALLOYS—Molybdenum

Vanadium Corp. of America, 120 Broadway, N. Y. C.

Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

Vanadium Corp. of America, 120 Broadway, N. Y. C.

FERRO ALLOYS—Silicon

Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y.

Samuel, Frank, & Co., Phila.

Vanadium Corp. of America, 120 Broadway, N. Y. C.

FERRO ALLOYS—Silicon-Aluminum

Vanadium Corp. of America, 120 Broadway, N. Y. C.

FERRO ALLOYS—Spiegeleisen

Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

New Jersey Zinc Co., Inc., The, 160 Front St., N. Y. C.

FERRO ALLOYS—Titanium

Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

Vanadium Corp. of America, 120 Broadway, N. Y. C.

FERRO ALLOYS—Tungsten

Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

FERRO ALLOYS—Vanadium

Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

Vanadium Corp. of America, 120 Broadway, N. Y. C.

FERRO ALLOYS—Zirconium

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Carborundum Co., The, Perth Amboy, N. J.

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Commonwealth Brass Corp., Detroit.

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FLEXIBLE SHAFT EQUIPMENT

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FLOODLIGHTS—Acetylene

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FLOOR PLATES—See Plates—Floor or Cellular Door**FLOORING—Acid Proof**

Nukem Prods. Corp., 68 Niagara St., Buffalo, N. Y.

FLOORING—Steel

Blaw-Knox Co., Pittsburgh

Central Iron & Steel Co., Harrisburg, Pa.

FLUX—Welding

Linde Air Prods. Co., The, 30 E. 42nd St., N. Y. C.

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Acme Machinery Co., Cleveland.

National Mchry. Co., Tiffin, Ohio.

FORGINGS—Brass, Bronze or Copper

Bossert Corp., The, Utica, N. Y.

Commonwealth Brass Corp., Detroit.

FORGINGS—Coin Pressed

Rockford (Ill.) Drop Forge Co.

FORGINGS—Drop, Iron or Steel

Atlas Drop Forge Co., Lansing, Mich.

Canton (Ohio) Drop Forging & Mfg. Co.

Harrisburg (Pa.) Pipe & Pipe Bending Co.

Oliver Iron & Steel Corp., Pittsburgh.

Rockford (Ill.) Drop Forge Co.

FORGINGS—Hollow

Harrisburg (Pa.) Pipe & Pipe Bending Co.

FORGINGS—Hydraulic Press, Iron or Steel

Atlas Drop Forge Co., Lansing, Mich.

Bethlehem (Pa.) Steel Company.

Mesta Machine Co., Pittsburgh.

Midvale Co., The, Nicetown, Phila., Pa.

FORGINGS—Magnesium Alloys

Dow Chemical Co., Midland, Mich.

FORGINGS—Upset

Bethlehem (Pa.) Steel Company.

Rockford (Ill.) Drop Forge Co.

FUME DUCTS—Rubber Lined

American Hard Rubber Co., 11 Mercer St., N. Y. C.

FURNACES—Billet or Ingot Heating

Flinn & Dreffeln Co., Chicago.

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McClintic-Marshall Corp., Bethlehem, Pa.

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Detroit (Mich.) Electric Furnace Co.

General Electric Co., Schenectady, N. Y.

Pittsburgh (Pa.) Lectromelt Furnace Corp.

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Carborundum Co., The, Perth Amboy, N. J.

FURNACES—Forging

Holcroft & Co., Detroit.

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Holcroft & Co., Detroit.

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Amer. Gas Furnace Co., Elizabeth, N. J.

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EXTREMELY LOW MAINTENANCE

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ELECTRIC and PNEUMATIC
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ADDRESS _____

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Boston Gear Wks., Inc., Norfolk Downs, Mass.
 Earle Gear & Machine Co., Phila.
 Gleason Works, Rochester, N. Y.
 Pittsburgh (Pa.) Hoist Corp.
 Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

GEAR CUTTING MACHINES

Gleason Works, Rochester, N. Y.

GEAR DRIVES—Herringbone

Lewis Foundry & Mch. Co., Pittsburgh

GEAR MATERIAL—Laminated, Non-Metallic

Synthane Corp., Oaks, Pa.

GEAR PLANING MACHINES

Gleason Works, Rochester, N. Y.

GEARS—Bevel

Boston Gear Wks., Inc., Norfolk Downs, Mass.

Gleason Works, Rochester, N. Y.

GEARS—Heat Treated

Boston Gear Wks., Inc., Norfolk Downs, Mass.

Gleason Works, Rochester, N. Y.

GEARS—Herringbone

Demag Corp., Duisburg, Germany.

Mesta Machine Co., Pittsburgh.

GEARS—Machine Cut

Boston Gear Wks., Inc., Norfolk Downs, Mass.

Gleason Works, Rochester, N. Y.

GEARS—Non-Metallic

Boston Gear Wks., Inc., Norfolk Downs, Mass.

General Electric Co., Schenectady, N. Y.

GEARS—Spur

Boston Gear Wks., Inc., Norfolk Downs, Mass.

GEARS—Worm

Boston Gear Wks., Inc., Norfolk Downs, Mass.

GENERATORS—Acetylene

Air Reduction Sales Co., 60 East 42nd St., N. Y. C.

Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

GENERATORS—Electric

Lincoln Electric Co., Cleveland.

GENERATORS—Electric, Second Hand

Belyea Co., Inc., 147 W. 18th St., N. Y. C.

Motor Repair & Mfg. Co., Cleveland

Dart, E. M. Mfg. Co., Prov., E. I.

GOVERNORS—Air Compressor

Westinghouse Traction Brake Co., Industrial Div., Pittsburgh.

GREASE—Lubricating

Socony - Vacuum Corp., 26 Broadway, N. Y. C.

Sun Oil Co., Philadelphia

Tide Water Oil Sales Corp., 17 Battery Place, N. Y. C.

GRINDING AND POLISHING MACHINES

Calder, Geo. H., Lancaster, Pa.

Excelsior Tool & Mch. Co., E. St. Louis, Ill.

Norton Co., Worcester, Mass.

Grinding Machines—Cylindrical

Norton Co., Worcester, Mass.

GRINDING MACHINES—Die

Landis Mch. Co., Inc., Waynesboro, Pa.

GRINDING MACHINES—Disc

Production Machine Co., Greenfield, Mass.

GRINDING MACHINES—Portable Pneumatic

Warner & Swasey Co., The, Cleveland.

GRINDING MACHINES—Roll

Farral-Birmingham Co., Inc., Ansonia, Conn.

GRINDING MACHINES—Snagging

Warner & Swasey Co., The, Cleveland.

GRINDING MACHINES—Surface

Abrasive Machine Tool Co., E. Prov., E. I.

Norton Co., Worcester, Mass.

GRINDING MACHINES—Tool

Norton Co., Worcester, Mass.

GRINDING MACHINES—Universal

Norton Co., Worcester, Mass.

GRINDING WHEEL DRESSERS AND CUTTERS

Calder, Geo. H., Lancaster, Pa.

GRINDING WHEELS

Bakelite Corp., 247 Park Ave., N. Y. C.

Carborundum Co., The, Niagara Falls, N. Y.

Norton Co., Worcester, Mass.

GRIT—Steel

Pittsburgh (Pa.) Crushed Steel Co.

HACK SAW BLADES—See Saws—Hack

Saw Blades

HACK SAW MACHINES

Armstrong-Hlum Mfg. Co., Chicago.

Victor Saw Works, Inc., Middletown, N. Y.

HAMMERS—Drop

Pittsburgh (Pa.) Foundry Co.

Morgan Engineering Co., Alliance, Ohio.

HAMMERS—Power

Barbour-Stockwell Co., Cambridge, Mass.

HAMMERS—Steam

Erle (Pa.) Foundry Co.

Morgan Engineering Co., Alliance, Ohio.

HANGERS—Ball Bearing

S. K. F. Industries, Inc., 40 E. 34th St., N. Y. C.

HARDNESS TESTING MACHINES

Shore Instrument & Mfg. Co., Inc., Jamaica, L. I., N. Y.

HEADING MACHINES

National Mchry. Co., Tiffin, Ohio.

HEADING MACHINES—Automatic, Electric

National Mchry. Co., Tiffin, Ohio.

HEAT TREATING

Barnes-Gibson-Raymond, Inc., Detroit.

Barnes, Wallace Co., The, Bristol, Conn.

General Machine Wks., York, Pa.

Gibson, Wm. D. Co., Chicago.

Farish Pressed Steel Co., Reading, Pa.

HOISTS—Air

Detroit (Mich.) Hoist & Mch. Co.

Ridgway, Craig & Son Co., Coatesville, Pa.

HOISTS—Electric

American Engineering Co., Philadelphia.

Detroit (Mich.) Hoist & Mch. Co.

Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.

Payne, N. B. & Co., 105 West 55th St., N. Y. C.

Shaw-Box Crane & Hoist Co., Inc., 402 Broadway, Muskegon, Mich.

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

HOISTS—Electric Traveling

Cleveland Electric Tramway, Wickliffe, O.

Shaw-Box Crane & Hoist Co., Inc., 402 Broadway, Muskegon, Mich.

HOISTS—Monorail

Shaw-Box Crane & Hoist Co., Inc., 402 Broadway, Muskegon, Mich.

Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

HOOKS—Wire

Titchener, E. H. & Co., Binghamton, N. Y.

HOOPS—Wire

American Steel & Wire Co., Chicago.

HOSE—Rubber

Goodrich, B. F., Rubber Co., Akron, Ohio

HYDRANTS—Fire

Wood, B. D. & Co., Philadelphia.

HYDRAULIC MACHINERY

Baldwin-Southwark Corp., Southwark Div., Philadelphia.

Elmes, Chas. F., Engrg. Wks., Chicago.

Morgan Engineering Co., Alliance, Ohio.

Wood, B. D. & Co., Philadelphia.

IDLE TIME CONTROL

National Acme Co., The, Cleveland.

INGOT MOLDS

Shenango Furnace Co., Pittsburgh.

Shenango-Penn Mold Co., Pittsburgh.

Snyder, W. P., & Co., Pittsburgh.

INGOT SLICING MACHINES

Waldrich, H. A., Siegen, Germany.

INGOTS—Phosphor Bronze

Phosphor Bronze Smelting Co., Philadelphia.

INSTRUMENTS—Recording

Bristol Co., Waterbury, Conn.

IRON—Genuine Open Hearth Iron

Newport (Ky.) Rolling Mill Co.

IRON—Genuine Wrought

Reading Iron Co., Philadelphia.

IRON—Rustless

Ludlum Steel Co., Watervliet, N. Y.

IRON—Staybolt

Burden Iron Co., The, Troy, N. Y.

KEYS—Riveted

Western Wire Prods. Co., St. Louis, Mo.

KEYSEATING MACHINES

Davis Keyseater Co., Rochester, N. Y.

LACING—Belt, Rawhide or Leather

Clipper Belt Lacer Co., Grand Rapids, Mich.

LAMPS—Filament

General Electric Co., Cleveland, Ohio.

LAMPS—Mercury Vapor

General Electric Vapor Lamp Co., Hoboken, N. J.

LATHES—Automatic

Haiford Machine Co., Bridgeport, Conn.

Jones & Lamson Mch. Co., Springfield, Vt.

LATHES—Brass

Warner & Swasey Co., The, Cleveland.

LATHES—Chucking

Jones & Lamson Mch. Co., Springfield, Vt.

Warner & Swasey Co., The, Cleveland.

LATHES—Crankshaft

Waldrich, H. A., Siegen, Germany.

LATHES—Engine

Schless-Defries A.-G. Düsseldorf, Germany.

Waldrich, H. A., Siegen, Germany.

LATHES—Roll

Lewis Foundry & Mch. Co., Pittsburgh

Mesta Machine Co., Pittsburgh.

LATHES—Second-Hand

Botwinik Brothers, Inc., New Haven, Conn.

Eastern Mchry. Co., 3263 Spring Grove Ave., Cincinnati, O.

McCabe, R. J., 580 Fifth Ave., New York City.

Miles Mchry. Co., Saginaw, W. S., Mich.

Noble Mchry. Co., Inc., 217 Centre St., New York City.

LATHES—Turret

Bardons & Oliver, Cleveland.

Jones & Lamson Mch. Co., Springfield, Vt.

Warner & Swasey Co., The, Cleveland.

LEVELING MACHINES

Schatz Mrg. Co., The, Poughkeepsie, N. Y.

Wean Engineering Co., Inc., The, Warren, Ohio.

LIQUIDATORS

Industrial Plants Corp., Philadelphia.

LOCOMOTIVES—Electric

Atlas Car & Mfg. Co., Cleveland.

General Electric Co., Schenectady, N. Y.

LOCOMOTIVES—Storage Battery

Atlas Car & Mfg. Co., Cleveland.

LUBRICANTS—Crusher & Grinding

Socony - Vacuum Corp., 26 Broadway, N. Y. C.

Sun Oil Co., Philadelphia.

Tide Water Oil Sales Corp., 17 Battery Place, N. Y. C.

LUBRICANTS—Gear

Socony - Vacuum Corp., 26 Broadway, N. Y. C.

Sun Oil Co., Philadelphia.

Tide Water Oil Sales Corp., 17 Battery Place, N. Y. C.

LUBRICANTS—High Pressure & Temperature

Socony - Vacuum Corp., 26 Broadway, N. Y. C.

Sun Oil Co., Philadelphia.

Tide Water Oil Sales Corp., 17 Battery Place, N. Y. C.

LUBRICANTS—Mine Cars

Socony - Vacuum Corp., 26 Broadway, N. Y. C.

Sun Oil Co., Philadelphia.

Tide Water Oil Sales Corp., 17 Battery Place, N. Y. C.

LUBRICANTS—Mining Machines

Socony - Vacuum Corp., 26 Broadway, N. Y. C.

Sun Oil Co., Philadelphia.

Tide Water Oil Sales Corp., 17 Battery Place, N. Y. C.

LUBRICANTS—Railroad

Socony - Vacuum Corp., 26 Broadway, N. Y. C.

Sun Oil Co., Philadelphia.

Tide Water Oil Sales Corp., 17 Battery Place, N. Y. C.

LUBRICANTS—Roll Neck—Anti-Friction & Plain

Socony - Vacuum Corp., 26 Broadway, N. Y. C.

Sun Oil Co., Philadelphia.

Tide Water Oil Sales Corp., 17 Battery Place, N. Y. C.

LUBRICANTS—Tippie & Cleaning

Socony - Vacuum Corp., 26 Broadway, N. Y. C.

Sun Oil Co., Philadelphia.

Tide Water Oil Sales Corp., 17 Battery Place, N. Y. C.

MACHINE WORK

Cowdrey Mch. Wks., 30 Summer St., Fitchburg, Mass.

Eisler Electric Corp., 765 South 13th St., Newark, N. J.

Parquhar, A. B. Co., Ltd., York, Pa.

General Mach. Works, York, Pa.

National Equipment Co., Springfield, Mass.

Read Mchry. Co., Inc., York, Pa.

Torrington (Conn.) Mfg. Co., The.

MACHINERY DEALERS

Crawford, F. H. & Co., 50 Church St., N. Y. C.

Delta Equipment Co., Philadelphia.

Donahue Steel Prods. Co., 1609 W. 74th St., Chicago.

Eastern Mchry. Co., 3263 Spring Grove Ave., Cincinnati, O.

Freese Material Equipment Co., Chicago, Ill.

Industrial Plants Corp., Philadelphia.

Iron & Steel Products, Inc., Chicago.

Iroquois Mchry. Co., 656 Ohio St., Buffalo, N. Y.

Lucas, J. L. & Son, Inc., Bridgeport, Ct.

McCabe, R. J., 580 Fifth Ave., New York City.

Marr-Galbreath Mchry. Co., Pittsburgh.

Miles Mchry. Co., Saginaw, W. S., Mich.

Morey & Co., Inc., 419 Broome St., N. Y. C.

Morris Machinery Co., Inc., Newark, N. J.

Noble Mchry. Co., Inc., 217 Centre St., New York City.

O'Brien Machinery Co., Philadelphia.

Rockford (Ill.) Power Mchry. Co., 623 Sixth St.

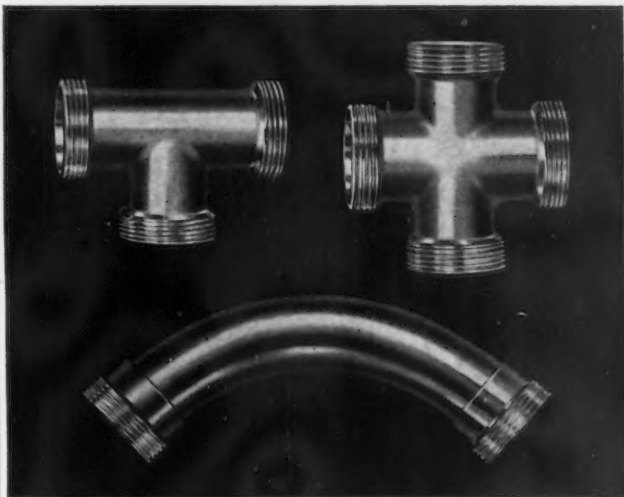
Ryerson, Joseph T. & Son, Inc., Chicago.

Simmons Mch. Tool Corp., Albany, N. Y.

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Tide Water Oil Sales Corp., 17 Battery Place, N. Y. C.

ORES—Iron

Cleveland (Ohio) Cliffs Iron Co.
Hanna Furnace Corp., The, Detroit, Mich.
Pickands, Mather & Co., Cleveland.
Shenango Furnace Co., Pittsburgh.
Snyder, W. P., & Co., Pittsburgh.

OVENs—Coke and By-Product Recovery

Koppers Construction Co., The, Pittsburgh.

OVENs—Core and Meld

Crawford Oven Co., The, 203 Shelton Ave., New Haven, Conn.
Holcroft & Co., Detroit.

OVENs—Cross Regenerative

Koppers Construction Co., The, Pith.

OVENs—Enameling and Japanning

Carborundum Co., The, Perth Amboy, N. J.
Crawford Oven Co., The, 203 Shelton Ave., New Haven, Conn.

OXY-ACETYLENE—Shape-Cutting Machines

Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

OXYGEN

Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

PACKING—Metallic

Garlock Packing Co., The, Palmyra, N. Y.

PACKING—Rubber

Goodrich, B. F., Rubber Co., Akron, Ohio.

PACKING—Sheet, Asbestos or Rubber

Garlock Packing Co., The, Palmyra, N. Y.

PERFORATED METAL

Harrington & King Perforating Co., Chi.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

PHOSPHOR—Copper

Phosphor Bronze Smelting Co., Philadelphia.

PICKLING COMPOUNDS

American Chemical Paint Co., Ambler, Pa.

PICKLING MACHINES

Mesta Machine Co., Pittsburgh.

PIG IRON

Cleveland (Ohio) Cliffs Iron Co.
Hanna Furnace Corp., The, Detroit, Mich.
Pickands, Mather & Co., Cleveland.
Republic Steel Corp., Youngstown, Ohio.
Shenango Furnace Co., Pittsburgh.
Shenango-Penn Mold Co., Pittsburgh.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

PILING—Steel Sheet

Inland Steel Co., Chicago.

Jones & Laughlin Steel Corp., Pittsburgh.

PINIONS—Rolling Mill

Mesta Machine Co., Pittsburgh.

PINIONS—Wire and Rod

Bathbone, A. B. & J., Palmer, Mass.

PINS—Airbrake

Champion Rivet Co., Cleveland, Ohio.

PIPE—Cast Iron, B. & S. and Flanged

Wood, R. D., & Co., Philadelphia.

PIPE—Genuine Wrought Iron

Reading Iron Co., Philadelphia.

PIPE—Hammer Welded

National Tube Co., Pittsburgh.

PIPE—New and Second-Hand

Albert & Davidson Pipe Corp., 2nd Ave., 50-51st St., Bklyn., N. Y.

Albert Pipe Supply Co., Inc., Berry and N. 12th St., Bklyn., N. Y.

Greenpoint Iron & Pipe Co., Inc., 137-197 Maspeth Ave., Bklyn., N. Y.

PIPE—Riveted Steel

McClintic-Marshall Corp., Bethlehem, Pa.

PIPE, STEEL—Rubber Lined

American Hard Rubber Co., 11 Mercer St., N. Y. C.

PIPE—Seamless Brass or Copper

Wolverine Tube Co., Detroit.

PIPE—Spiral Welded

American Rolling Mill Co., Middletown, O.

PIPE—Standard, Black and Galvanized

Jones & Laughlin Steel Corp., Pittsburgh.

National Tube Co., Pittsburgh.

Republic Steel Corp., Youngstown, Ohio.

Youngstown (Ohio) Sheet & Tube Co.

PIPE—Welded, Electric

Republic Steel Corp., Youngstown, Ohio.

PIPE BENDING & FABRICATING

Pittsburgh (Pa.) Piping & Equipment Co.

PIPE CUTTING AND THREADING

MACHINES

Jarecki Mfg. Co., Erie, Pa.

Landis Mach. Co., Inc., Waynesboro, Pa.

Merrill Mfg. Co., Toledo.

Taylor-Willson Mfg. Co., McKees Rocks, Pa.

PIPE FITTINGS

Jarecki Mfg. Co., Erie, Pa.

PLANING MACHINES—Metal

Schless-Defries, A.-G., Dusseldorf, Germany.

PLANING MACHINES—Second-Hand

Miles Mchry. Co., Saginaw, W. S. Mich.

PLANTS FOR SALE

Industrial Plants Corp., Philadelphia.

PLATERS' CLEANING COMPOUND

American Chemical Paint Co., Ambler, Pa.

PLATES—Floor or Ceiling Deer

Alan Wood Steel Co., Conshohocken, Pa.
Carnegie Steel Co., Pittsburgh.
Central Iron & Steel Co., Harrisburg, Pa.
Inland Steel Co., Chicago.

PLATES—Iron or Steel

Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Company.
Carnegie Steel Co., Pittsburgh.
Central Iron & Steel Co., Harrisburg, Pa.
Granite City (Ill.) Steel Co.
Illinois Steel Co., Chicago.

Inland Steel Co., Chicago.

Jones & Laughlin Steel Corp., Pittsburgh.

Ryerson, Joseph T., & Sons, Inc., Chicago.

Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

Weirton (W. Va.) Steel Co.

Youngstown (Ohio) Sheet & Tube Co.

PLUGS—Core Hole

Hubbard, M. D., Spring Co., Pontiac, Mich.

POLISHING MACHINES—Belt

Production Machine Co., Greenfield, Mass.

PRESSED METAL PARTS

Champion Sheet Metal Co., Inc., Cortland, N. Y.

Crosby Co., The, Buffalo, N. Y.

PRESSED STEEL PARTS

Bossert Corp., The, Utica, N. Y.

Crosby Co., The, Buffalo, N. Y.

Lansing (Mich.) Stamping Co., So. Penn Ave.

Parish Pressed Steel Co., Reading, Pa.

Truscon Steel Co. Pressed Steel Div., Cleveland.

PRESSES—Drop—See Hammers—Drop**PRESSES—Coining**

National Mchry. Co., Tiffin, Ohio.

PRESSES—Extrusion

Robertson, John, Co., 123 Water St., Brooklyn, N. Y.

PRESSES—Foot

Baird Machine Co., Bridgeport, Conn.

PRESSES—Forging

Mesta Machine Co., Pittsburgh.

Morgan Engineering Co., Alliance, Ohio.

PRESSES—Forming and Bending

Dreis & Krump Mfg. Co., Chicago.

PRESSES—Friction Screw

Schatz Mfg. Co., The, Poughkeepsie, N. Y.

PRESSES—Hydraulic

Baldwin-Southwark Corp., Southwark Div., Philadelphia.

Elmer, Chas. F., Engrg. Works, Chicago.

Farrel-Birmingham Co., Inc., Ansonia, Conn.

Mesta Machine Co., Pittsburgh.

Morgan Engineering Co., Alliance, O.

Robertson, John, Co., 123 Water St., Brooklyn, N. Y.

Wood, E. D., & Co., Philadelphia.

PRESSES—Power

Baird Machine Co., Bridgeport, Conn.

Dreis & Krump Mfg. Co., Chicago, Ill.

Farrel-Birmingham Co., Inc., Ansonia, Conn.

Hyman, Joseph, & Sons, Phila.

New Albany (Ind.) Mch. Mfg. Co.

Niagara Machine & Tool Works, Buffalo, N. Y.

Schatz Mfg. Co., The, Poughkeepsie, N. Y.

V & O Press Co., Hudson, N. Y.

PRESSES—Trimming

Erie (Pa.) Foundry Co.

PRINTING MACHINES—Copying

Paragon-Revolute Corp., 69 South Ave., Rochester, N. Y.

PRODUCTION CONTROL RECORDER—See Idle Time Control**PUMPS—Hydraulic**

Elmer, Chas. F., Engrg. Works, Chicago.

PUNCHES & DIES

Cleveland Steel Tool Co., The, 660 E. 82d St., Cleveland, Ohio.

PUNCHING AND SHEARING MACHINES

Bertsch & Co., Cambridge City, Ind.

Excelsior Tool & Mch. Co., E. St. Louis, Ill.

Ryerson, Jos. T., & Son, Inc., Chicago.

Schatz Mfg. Co., The, Poughkeepsie, N. Y.

Thomas Spacing Mach. Co., Pittsburgh.

PURIFIERS—Oil

National Acme Co., The, Cleveland.

PYROMETERS—Indicating

Bristol Co., Waterbury, Conn.

Hoskins Mfg. Co., Detroit, Mich.

RADIATION—Concealed Copper

Wolverine Tube Co., Detroit.

RAIL SPICE BARS

Ames, W., & Co., Jersey City, N. J.

RAILS

Illinois Steel Co., Chicago.

Inland Steel Co., Chicago.

Robinson & Orr, Pittsburgh.

Ryerson, Jos. T., & Son, Inc., Chicago.

Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

Weirton (W. Va.) Steel Co.

RAILS—Relaying

Hyman-Michaels Co., Chicago.

Sherwood, E. C., 5 Dey St., N. Y. C.

REAMERS

Cleveland (Ohio) Twist Drill Co.

Morse Twist Drill & Mch. Co., New Bedford, Mass.

REFRATORIES—Dolomite

Basic Dolomite, Inc., Cleveland, Ohio.

REGULATORS—Compressed Gas

Air Reduction Sales Co., 60 East 42nd St., N. Y. C.

Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

REINFORCEMENT FABRIC—Concrete

Pittsburgh (Pa.) Steel Co.

Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

RINGS—Iron or Steel

Midvale Co., The, Nicetown, Phila., Pa.

RINGS—Welded

American Welding & Mfg. Co., Warren, O.

RIVET MAKING MACHINERY

Acme Machinery Co., Cleve.

National Mchry. Co., Tiffin, Ohio.

RIVET SETS

Cleveland Steel Tool Co., The, 660 E. 82d St., Cleveland, Ohio.

RIVETING MACHINES

Shuster, F. B., Co., New Haven, Conn.

RIVETS

Champion Rivet Co., Cleveland, Ohio.

Clark Bros. Bolt Co., Milldale, Conn.

Oliver Iron & Steel Corp., Pittsburgh.

Progressive Mfg. Co., Torrington, Conn.

Russell, Burdell & Ward Bolt & Nut Co., Port Chester, N. Y.

Ryerson, Jos. T., & Son, Inc., Chicago.

RODS—Brass, Bronze, Copper or Nickel

Scovill Mfg. Co., Waterbury, Conn.

RODS—Magnesium Alloys

Dow Chemical Co., Midland, Mich.

RODS—Nickel Silver

Seymour (Conn.) Mfg. Co.

RODS—Phosphor Bronze

Phosphor Bronze Smelting Co., Philadelphia.

Seymour (Conn.) Mfg. Co.

RODS—Welding

Air Reduction Sales Co., 60 East 42nd St., N. Y. C.

American Steel & Wire Co., Chicago.

Champion Rivet Co., Cleveland.

Haynes Stellite Co., 30 East 42nd St., N. Y. C.

Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

Pittsburgh (Pa.) Steel Co.

Wilson Welder & Metals Co., Inc., North Bergen, N. J.

RODS—Wire

American Steel & Wire Co., Chicago.

Jones & Laughlin Steel Corp., Pittsburgh.

Pittsburgh (Pa.) Steel Co.

Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

Youngstown (Ohio) Sheet & Tube Co.

ROLLING MACHINERY—Cold Rolling

Lewis Foundry & Mch. Co., Pittsburgh.

ROLLING MACHINERY—Sheet Metal

Lewis Foundry & Mch. Co., Pittsburgh.

ROLLING MILL MACHINERY

Demag Corp., Duisburg, Germany.

Farrel-Birmingham Co., Inc., Ansonia, Conn.

Hyde Park (Pa.) Fdry. & Mch. Co.

Lewis Foundry & Mch. Co., Pittsburgh.

Mesta Machine Co., Pittsburgh.

National Roll & Fdry. Co., Avonmore, Pa.

United Engineering & Fdry. Co., Pith.

ROLLS—Alloy Steel

Pittsburgh (Pa.) Rolla Corp.

ROLLS—Bending and Straightening

Baldwin-Southwark Corp., Southwark Div., Philadelphia.

Bertsch & Co., Cambridge City, Ind.

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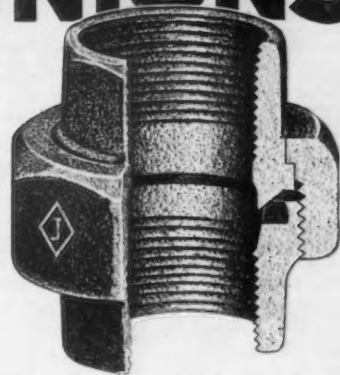
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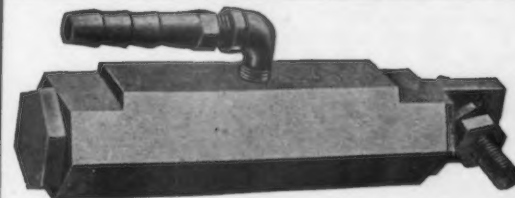


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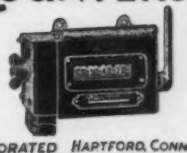
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2-200	G. E.	4000/2200	ATI-Synch.	514
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1-200	West.	440/220	CW-Slip Ring	500
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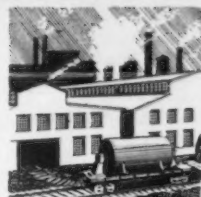
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